A MULTIVARIATE ANALYSIS OF
PARTICIPATION IN THE
FOOD STAMP PROGRAM

October 26, 1990

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EXECUTIVE SUMMARY

Although estimates of the rate of participation in the Food Stamp Program (FSP) vary across studies, the consensus is that substantially less than 100 percent of the households eligible to receive food stamp benefits actually do so. The most recent estimates indicate that approximately 60 percent of FSP-eligible households participate in the program. Policymakers and program administrators have expressed concern about this less-than-universal participation.

To address that concern, a number of studies have investigated the demographic and economic characteristics associated with the participation of FSP-eligible households. Using survey data and multivariate analysis, researchers have estimated the *net effect* of a given characteristic on the probability of participation—that is, the effect of a given characteristic when the effects of other characteristics are factored out. Estimates of these net effects could prove useful in targeting outreach efforts toward specific demographic groups, in forecasting changes in participation associated with changes in the demographic composition of the low-income population, and in simulating the change in caseloads and expenditures stemming from changes in program regulations.

This report uses 1985 data from the Survey of Income and Program Participation (SIPP) to update previous multivariate analyses of the relationship between household characteristics and FSP participation. It expands the existing research in several ways:

- Most previous studies were based on data collected before the Food Stamp Act of 1977, which eliminated the food stamp purchase requirement, was fully implemented; this report uses SIPP data collected in 1985.

- In contrast to most other data sources, SIPP provides sub-annual (generally monthly) information on a household's income, assets, expenses, composition, and program participation; hence, it is the ideal data source for estimating FSP eligibility and potential benefits, which are determined on the basis of monthly data.

- This report pays special attention to the relationship between participation and the FSP benefit amount, since a knowledge of the response of the participation rate to changes in benefit levels is essential when the impact of reforms on the program's caseload and expenditures is simulated.

- The estimation results are presented in a way that facilitates their interpretation; rather than presenting coefficients from the multivariate analysis, this report presents participation rates computed at different levels of each household characteristic, holding the other characteristics constant at their sample means.

FINDINGS

This analysis considers three sets of household characteristics: demographic characteristics, economic characteristics, and the benefit amount to which the household is entitled. The analysis is applied to the universe of households eligible for the FSP, and to four subgroups of this universe--households with an elderly member, households with a disabled member, female-headed households with children, and two-parent households with children.

Demographic Characteristics and FSP Participation

The report examines the relationship between FSP participation and five demographic characteristics of the household: the age, education, and ethnicity of the reference person, the presence of children, and household size. The main findings are as follows:

- The relationship between the *age of the reference person* and participation is not a linear one. Participation is substantially higher when the reference person is 30 to 39 years old, and lower when he or she is age 70 or older. However, the remaining age groups, including 15- to 29- and 60- to 69-year-olds, participate at approximately the same rate. This finding implies that among households with an elderly reference person (age 60 or older) participation differs substantially according to whether the reference person is young-old (60 to 69 years) or old-old (70 years or older).

- As expected based on previous research, participation tends to decline as the *education of the reference person* increases; thus, participation is highest among households in which the reference person has less than a high school education.

- Differences in participation by the *race of the reference person* are much less prevalent than indicated by previous research. A large difference in participation between black and white households exists only among households that contain a disabled member. A significant but small difference between the two racial groups is found in the overall population. However, among households with an elderly member and among female-headed households with children, there is basically no difference in participation according to the race of the reference person.

- Hispanic households participate at the same rate as white non-Hispanic households, with the exception of two-parent households with children, in which Hispanic households participate at a much lower rate.

- Another finding that was somewhat unexpected given the results of previous studies is that the *presence of children* by itself does not have any substantial effect on the probability of participation. However, it is important to note that this results was obtained by holding the size of the household constant.

- Participation increases with the *size of the household* up to household-size three, after which it tends to level off. Participation is exceptionally low among one-person households, which are disproportionally (66 percent) elderly households.

Economic Characteristics and FSP Participation

The report examines the relationship between FSP participation and four economic characteristics of households: the household's gross income (divided by the poverty threshold), whether the household receives public assistance, and whether the household has earnings and assets.

- The estimated relationship between *gross income* and FSP participation is not completely in accordance with prior expectations. Households at the two extremes of the income distribution among eligible households—that is, those with no income at all and those whose income is above 130 percent of the poverty threshold—have unexpectedly low and unexpectedly high participation rates, respectively.

  - Households with no income report participating at rates that are much lower than would be expected given their alleged lack of resources. This result might be due to, among other things, the underreporting of income; that is, it is likely that many of these households actually did receive some type of income, but failed to report it.

  - No clear explanation exists for the fact that households whose income exceeds 130 percent of poverty participate at a rate that is about 10 percentage points above the participation rate of households whose income is between 100 and 130 percent of poverty.

- Among households between those two extremes, the relationship between income and participation is clearly negative, in the sense that households with a higher income/poverty ratio are less likely to participate in the FSP.

- The *receipt of public assistance* is the strongest predictor of FSP participation—households that receive public assistance participate at dramatically higher rates than those that do not.

- Although previous studies have consistently found that earnings are negatively associated with participation, this analysis finds that the negative effect of the *presence of earnings* is large and statistically significant only among female-headed households with children.

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- Households with *assets* participate in the FSP at rates that are significantly lower than those of households without assets.

The Benefit Amount and FSP Participation

The analysis devotes special attention to the relationship between the probability of participation and the food stamp benefit amount to which the household is entitled. In addition to providing descriptive information, the analysis generates an estimate of the participation response that can be used to simulate program reforms—that is, to predict how FSP participation would change under a reform that altered the size and distribution of the benefit across households.

The main methodological difficulty in estimating this participation response arises from the design of the FSP: the fact that the FSP benefit formula is applied uniformly in all states implies that the benefit amount varies little among households of the same size and with the same total income. Consequently, it is difficult to distinguish between the *net* effect of the benefit amount on participation and the effects of income and household size. Due to this and other methodological problems, the results of this analysis should be interpreted with caution. The basic findings from the analysis are as follows:

- The relationship between the FSP benefit amount and participation in the program is *positive* overall. However, when income, household size, and other demographic and economic characteristics are held constant, the *net* effect of the benefit amount on participation is rather *small*: the difference in the participation rate between households that receive $10 or less worth of food stamp benefits and those that receive more than $220 is approximately 15 percentage points (the benefit amounts are expressed in 1985 dollars).

- An intuitive way to express the relationship between benefits and participation is the percentage point increase in participation associated with a $10 increase in benefits. The analysis suggests that such increase elicits a different response according to the current level of benefits: at $30, the participation response to a $10 increase is 1.5 percentage points; however, the response drops to 0.35 percentage points at $150 of current benefits.

I. INTRODUCTION

Although estimates of the rate of participation in the Food Stamp Program (FSP) vary across studies, the consensus among analysts is that substantially less than 100 percent of the households that are eligible to participate in the program actually do so. The most recent estimates have indicated that approximately 60 percent of FSP-eligible households participate in the program (Doyle and Beebout, 1988; Ross, 1988; and Doyle, 1990). Policymakers and program administrators have expressed concern about the reasons for this less-than-universal participation, and are interested in the factors that are associated with nonparticipation and how program reforms would affect the participation rate.

Using data from household surveys, such as the Panel Study on Income Dynamics (PSID), researchers have investigated self-reported reasons for nonparticipation by FSP-eligibles. When eligible nonparticipants were asked why they were not participating in the program, the majority responded that they did not realize they were eligible, while a smaller number responded that they did not need the stamps or that the costs of participation, such those involved in applying for the benefits, outweighed the potential benefits (Blaylock and Smallwood, 1984, U.S. General Accounting Office, 1988). Although extremely valuable, this type of research is based exclusively on subjective, perceptual data, and thus cannot address either the quantitative effects of the factors associated with nonparticipation, nor the impact of policy reforms on the FSP participation rate. Furthermore, this research is limited by the fact that most data sets do not include information on the reasons for nonparticipation.

Another strand of research on FSP participation has attempted to identify the demographic and economic characteristics associated with participation among FSP-eligible households. Using survey data and multivariate analysis, researchers have estimated the *net* effect of a given characteristic on the probability of participation—that is, the effect of a given characteristic when

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the effect of other characteristics is factored out. Estimates of these net effects can be used to target outreach efforts toward specific demographic groups, to forecast changes in participation associated with changes in the economy, and to simulate the change in caseloads and expenditures stemming from changes in program regulations.

Unfortunately, several methodological and survey data problems limit the reliability of the findings from this type of research: (1) income and program participation are typically underreported in household surveys; (2) the food stamp eligibility determination process and the amount of benefits to which the eligible household is entitled must be simulated on the basis of data that do not include all of the necessary information; and (3) the information on the costs of participation available in household surveys is typically absent or very limited. In turn, these problems preclude researchers from controlling for all of the relevant factors in the household's participation decision, identifying all program participants, and perfectly classifying households as eligible or ineligible.

Despite these limitations, studies of the factors associated with participation in the FSP have generated a consistent set of findings.[1] In particular, households with relatively low incomes, and households headed by an employed person, an elderly person, or a more educated person, were less likely to participate in the FSP, while households that participated in other assistance programs, and households that were female-headed or nonwhite were more likely to participate in the program.[2] However, most of these studies are based on data collected before the Food Stamp Act of 1977 was fully implemented. If participation behavior changed after the

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[1]Appendix A provides a synopsis of these findings (taken from Allin and Beebout, 1989, Table 3).

[2]As discussed in Chapter V, less consensus has been reached about the relationship between the FSP benefit amount for which the household is eligible and the probability of participation.

elimination of the purchase requirement--the major provision of the Act--the findings of the existing literature cannot be applied to the FSP in its present form.[3]

In this report, we use 1985 data from the Survey of Income and Program Participation (SIPP) to update previous multivariate analyses of the relationship between household characteristics and FSP participation. We attempt to improve upon the existing research in four ways. First, our sample of FSP-eligible households and the amount of benefits to which they are entitled was obtained with a sophisticated computer simulation based on SIPP data (Doyle, 1990). Because SIPP provides sub-annual information on a household's income, assets, expenses, composition, and program participation, it is the ideal data source for estimating FSP eligibility and potential benefits.

Second, we devote special analytical attention to the relationship between participation and the amount of the FSP benefit. A knowledge of the response of the participation rate to changes in benefit levels is essential when forecasting the impact of reforms on program caseload and expenditures. We examine the methodological and practical problems involved in estimating such a response.

Third, our analysis applies both to all eligible households and to four subgroups of the eligible population: households with an elderly member, households with a disabled member, female-headed households with children, and two-parent households with children. Thus, we can examine whether the relationship between a household's participation and its economic and demographic characteristics varies across the different groups.

Finally, we present our estimation results in a way that facilitates their interpretation. Rather than presenting the estimates of the coefficients of the participation equation, we use the

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[3]Before the purchase requirement was eliminated, households had to spend a portion of their income to obtain a given dollar value of food stamps. When this requirement was eliminated, the program became more accessible to eligible, low-income households, since they no longer needed cash in order to receive the food stamps.

estimated coefficients to calculate predicted participation rates at different levels of each of the demographic and economic characteristics examined.

The remainder of this report is organized as follows. Chapter II contains a detailed discussion of the data and methodology used in the analysis. The findings of the analysis are presented in Chapters III through V. Chapter III examines the relationship between the demographic characteristics of households and their participation in the FSP, while Chapter IV extends the analysis to the economic characteristics of households. Findings on the relationship between the FSP benefit amount and participation in the program are presented in Chapter V. Chapter VI provides a summary of the findings and offers some concluding remarks.

II. DATA AND METHODOLOGY

This chapter discusses the methodological issues involved in our multivariate analysis of participation in the FSP.

The first step in a multivariate analysis of FSP participation is to define a sample of households representative of the population of households eligible to receive food stamps at a given point in time. This task is particularly challenging, since neither existing household surveys nor existing administrative data contain direct information on eligibility status. Once a sample of eligible households is available, the researcher must then specify how participation is related to the household's characteristics. This step entails specifying a "participation equation"--that is, the link between the outcome (participation or nonparticipation) and the observed characteristics that "explain" the variability in the outcome (why certain eligible household participate and others do not).

In the first section in this chapter, we describe how we used data from the Survey of Income and Program Participation (SIPP) to obtain a sample of households simulated as eligible for the FSP. Section B discusses the specification of the participation equation, as well as its behavioral interpretation. Section C concentrates on issues pertaining to the types of variables that we included in the participation equation. Finally, Section D illustrates how we present the estimation results in this report.

A. SIMULATION OF ELIGIBILITY FOR THE FSP WITH SIPP-BASED ESTIMATES[4]

The Survey of Income and Program Participation is a nationally representative longitudinal survey of adults in the United States, providing detailed monthly information on income, labor

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[4]This section draws heavily on Doyle (1990). The reader familiar with SIPP and with the issues involved in eligibility simulation can skip to Section B.

force activity, and program participation. It is a multipanel longitudinal survey to which a replacement panel is added each year. At the time this study was initiated, only data from the first two (1984 and 1985) panels were available. Each panel contains information on persons in a longitudinal sample followed for a period of over two and one-half years. The adults in the sample, age 15 or older, are interviewed every four months. In each round of interviewing (or "wave"), a core questionnaire collects information on each of the four months preceding the interview date. In most waves, the monthly core questions are supplemented with questions on a variety of topical issues that vary from wave to wave. Because the interviewing process is staggered, the reference period covered in any given wave is not the same for all sample members.[5]

One feature of the SIPP design that is particularly relevant to this study is that the SIPP panels overlap for part of their duration. Thus, cross-sectional samples can be constructed with observations from more than one panel, so that larger sample sizes can be obtained. The data used in our analysis combine information from the 1984 and 1985 panels of SIPP for the month of August 1985.[6]

The sample to be used to estimate a participation equation must be restricted to households that are eligible for the Food Stamp Program. Since eligibility cannot be observed

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[5]For further information on the design and scope of SIPP, see U.S. Department of Commerce (1987).

[6]More specifically, we derived our sample by combining observations from Wave 7 of the 1984 panel and Wave 3 of the 1985 panel. Each of the two waves was merged with information collected in other selected waves of the respective panels. Although Wave 7 of the 1984 panel and Wave 3 of the 1985 panel were independent samples of the U.S. population, they were administered simultaneously. Furthermore, a straightforward adjustment to the sample weights allows estimates to be based on combined panels. We chose these two waves for the following reasons: (1) they contain topical information on assets; (2) together, they provide a relatively large sample size (27,660 households); and (3) they sampled the population in the month of August, making the reference period comparable to available administrative data, which is useful for quality control purposes.

directly, it must be simulated on the basis of the information provided by the household. The procedure for simulating the eligibility of a respondent household is designed to replicate as closely as possible the actual FSP eligibility determination process for each household in the SIPP dataset. In other words, program eligibility and benefit criteria are applied to each household as if it had actually applied for food stamps. Details on the eligibility simulation and on the file development process are provided in Mathematica Policy Research (1990) and in Doyle (1990).

Although SIPP contains more information on the variables necessary for determining FSP eligibility and benefits than does any other available household survey, some problems still remain. Despite the adjustments and enhancements made to the SIPP data, the simulation procedures cannot perfectly replicate the eligibility and benefit determination process mandated in the legislation. The specific discrepancies are as follows:

- Unit definition. Because SIPP does not measure the complete set of characteristics used in determining a food stamp unit--especially information on which dwelling-unit members customarily purchase and prepare food together--the simulated food stamp household is not the same as the unit determined by the food stamp case worker. For this study, the program unit composition reported in SIPP by households receiving FSP benefits was used to simulate the food stamp household. In other dwelling units that only receive cash assistance, the food stamp household was equal to the cash assistance unit, plus any spouse or related children under age 18 in the dwelling. In all other dwelling units, the simulated food stamp household was the same as the Census household.

- Countable assets. We used the financial, nonfinancial, and vehicular assets reported in SIPP to estimate countable assets, according to program rules. However, SIPP does not explicitly measure all of the information necessary for this purpose, such as cash on hand. Furthermore, persons not living in the household at the time of the interview are assumed to have no vehicular assets.

- Gross income. The measure of gross income used in this study is close to, but not precisely the same as, gross income reported to the food stamp case worker. First, survey data on income and program participation, including the data collected in SIPP, tend to be underreported. Second, the definition of income measured in SIPP is not precisely the same as that used to determine food stamp eligibility.

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Third, as noted above, the unit composition simulated with SIPP data differs from the case worker's determination of the food stamp household, and, hence, aggregate income for the food stamp household may differ as well.

- Net income. The measure of net income used in this study is not precisely the same as net income determined by the food stamp case worker, because of: (1) the use of approximated medical expenses for elderly and disabled individuals; (2) the use of approximated shelter expenses for individuals in the 1985 panel; and (3) the measurement error in the collection of shelter and child care expenses in SIPP. The SIPP definitions of shelter and dependent care expenses also differ slightly from the FSP definitions.

- Disability status. We determined disability status on the basis of reported disability and reported income receipt, as specified under the program. Reporting and measurement errors in SIPP may somewhat distort the number of disabled individuals identified in this manner.

Table II.1 shows the possible bias due to each of these measurement and reporting errors (from Figure A-1 in Doyle, 1990). The net result of these errors on the simulated eligibility status of a given household is uncertain.

TABLE II.1

FACTORS THAT AFFECT THE SIMULATION OF FOOD STAMP ELIGIBILITY
BASED ON SIPP DATA, AND THE DIRECTION OF THE BIAS

Source of Error	Effect on Estimates of the Number of Eligibles
Unit Definition	Underestimate
Countable Assets	Overestimate
Gross Income Underreporting Definition	Overestimate Underestimate
Net Income	Unknown
Disability Status	Underestimate

SOURCE: Figure A-1 in Doyle (1990).

Gross income underreporting will bias estimates of the number of eligible households upward, since more households will appear to have met the income limits than actually did. On the other hand, the omission of some types of expenses may bias the measurement of net income upward, thus leading to underestimates of the number of eligible households. However, an inability to perfectly replicate program regulations for calculating deductions from expenses may generate the reverse effect. Furthermore, SIPP omits selected assets, thus leading to overestimates of the size of the eligible population.

B.   SPECIFICATION OF THE PARTICIPATION EQUATION

We follow the existing literature on the determinants of participation in the FSP by specifying the econometric model of participation as a one-equation model, in which the dependent variable is the reported[7] participation status of the household (participant or nonparticipant), the explanatory variables are household characteristics (such as income, the presence of children, or the age of the reference person), and the estimation sample consists of households simulated to be eligible for the FSP on the basis of current characteristics. In formal terms, let P be reported participation, a discrete outcome; X a vector of household characteristics; B a vector of the parameters to be estimated, which represent the "net effect" of each variable on participation; and e the error term (that is, the sum of all unobserved factors that affect participation). As in most applications, we assume that the observed and unobserved factors enter "additively" into the participation equation:

(1) $P = XB + e$

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[7]Issues associated with the underreporting of FSP participation are discussed later in this section.

where **XB** denotes that each variable in the **X** vector is multiplied by the corresponding element in the **B** vector.

The fact that the dependent variable P is a discrete outcome represents a problem from an estimation point of view. The standard approach to this problem is to use the so-called "latent variable model." Equation (1) is rewritten as:

(2) $P^* = XB + e$

where P^* represents a continuous variable that can be thought as the "propensity to participate" in the FSP. Only a dichotomous realization of this variable is observed. The household participates if $P^* > 0$, and we observe P = 1. The household does not participates if $P^* < 0$, and we observe P = 0.

In addition to facilitating the econometric specification of the model, the latent variable model makes it easier to provide a behavioral interpretation of the participation equation. We characterize the error term e in model (2) as the eligible household's "distaste for participation," which cannot be observed and is assumed to be uncorrelated with the household's observable characteristics. *Ceteris paribus*, households with a greater distaste for participation are less likely to participate in the program. In this framework, the participation decision of a household depends on whether its distaste for participation crosses a threshold, which can be thought of as representing the "net benefit" from participation. This threshold depends on the household's observable characteristics. The lower the threshold (that is, the lower the net benefit), the lower the probability of participation. In other words, the presence of an unobservable distaste-for-participation component in the model rationalizes the fact that among observationally identical households (that is, those who have the same observed characteristics) some participate while others do not.

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We do not observe the household's distaste for participation; rather, we observe whether or not the household participates, which reveals whether the distaste for participation is lower or higher than the threshold. We also observe some of the household's characteristics. The coefficients B of the participation equation can be interpreted as the effect of each household characteristic on the net benefit from participation. A characteristic that increases the net benefit from participation also increases the *probability* of participation. Whether or not a particular household with that characteristic participates ultimately depends on the position of that household along the distribution of the distaste for participation.

With this conceptualization in mind, the participation equation can be reformulated as follows. As before, X_i is the vector of characteristics of the i-th household, and B the vector of coefficients ("marginal effects"), while the (negative of the) error term e_i now represents the distaste for participation. The quantity X_iB represents the value of the threshold for the i-th household. This household participates in the FSP if its distaste for participation is *less* than the threshold—that is, if:

(3) $-e_i < X_iB.$

The last component of the model to be specified is how the distaste component is distributed across households, which is equivalent to specifying the probability distribution of the error term $-e$. One assumption widely used in the literature is that $-e$ has a standard normal distribution. This assumption generates the so-called probit model.[8] The probability of participation for a household with characteristics X_i can be written as:

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[8] The choice of the probability distribution for the error term determines the particular estimation model. Normality leads to a probit model, while a logistic distribution yields a logit model. The estimation results typically do not differ substantially between the two models. We chose the probit model because it is computationally less expensive.

(4) Prob(participation) = Prob $(-e_i < X_iB)$ = $\phi(X_iB)$

and the probability of nonparticipation as:

(5) Prob(nonparticipation) = Prob $(-e_i > X_iB)$ = $1 - \phi(X_iB)$

where $\phi( )$ is the cumulative distribution function of the standard normal distribution. With this additional assumption, and with observations on each household, the vector of marginal effects B can be estimated with standard econometric techniques (maximum likelihood).

The estimated coefficients B of the participation equation can be used to *predict* the probability that an eligible household with given characteristics will participate in the FSP; such a probability can also be interpreted as the (predicted rather than actual) participation rate for that type of household.

Underreporting of Participation. An implicit assumption in the previous discussion is that the dependent variable of the participation equation is correctly observed for all eligible households. Unfortunately, there is solid evidence that participation in the FSP (as well as in other welfare programs) is *underreported* in household surveys. Thus, some of the households that are simulated as eligible and that are actually participating in the program are classified as not participating due to erroneous reporting.[9] However, whether such underreporting biases the estimates of the determinants of participation must still be determined. The existence of such

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[9] The opposite phenomenon takes place as well–that is, some households that report participating in the program are simulated as ineligible based on the income and assets information that they provide during the interview. We exclude the seemingly ineligible participants from the analysis in order to avoid any asymmetry that could lead to biased estimates of the determinants of participation. In fact, households for which the same "error" in the eligibility determination process is made (they are eligible but are simulated as ineligible), but that do not report participating are necessarily excluded from the analysis, since the error cannot be detected.

bias crucially depends on whether underreporting is correlated with the variables that are hypothesized to determine participation.

Let us take the case in which underreporting is *positively* correlated with a given household characteristic (for example, with the education of the household head), in the sense that better educated households are more likely to underreport participation. In this case, the estimated relationship between education and the probability of participation (measured by the coefficient on education in the participation equation) would be distorted. The estimated coefficients in the participation equation would reflect both the *true* impact of the characteristic on the probability of participation *and* its effect on the probability of underreporting.

Unfortunately, the underreporting problem in the context of a study that relies on micro-level data--that is, data on the individual households--cannot be resolved easily. In the context of an aggregate approach for estimating participation rates, Doyle and Beebout (1988) and Doyle (1990) have confronted underreporting by using counts of participants derived from administrative data, rather than survey data, as the numerator of the participation rate. This solution is clearly not applicable here, since this study requires information on eligibility and participation for *each* individual household.

Since no direct solution to the underreporting of participation seems to be available, ascertaining the correlation between underreporting and household characteristics would be useful. One way to obtain a measure of this correlation is to estimate a multivariate model of underreporting in which the universe is defined as the truly participating households, and the dependent variable is whether those households report participation. Unfortunately, a data set that contains this type of information is not publicly available.[10]

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[10]The Census Bureau has created such a data set by linking SIPP household data with the corresponding FSP administrative records of five states (Marquis and Moore, 1990). However, the data set cannot be made publicly available for reasons of confidentiality.

A very indirect way to obtain a measure of the relationship between underreporting and household characteristics is to compare the distribution of these characteristics among FSP participants in two different data sets, one in which the sample of participants may be affected by underreporting (such as with SIPP data) and one in which, in principle, participants are not affected by it (such as with administrative data). Along these lines, we have estimated the average value for a set of characteristics obtained from the sample of reported FSP participants in the SIPP database and for the FSP participants in the Integrated Quality Control System (IQCS) administrative data file. The results of this comparison, shown in Table II.2, suggest that underreporting is not strongly correlated with any of the characteristics considered. While this finding does not exclude the possibility that the estimation results presented in the following chapters are biased, it suggests that this bias might not be large enough to affect the major findings.

C.   THE EXPLANATORY VARIABLES IN THE PARTICIPATION EQUATION

This section addresses several issues related to the explanatory variables that are chosen for the participation equation. It also describes the demographic subgroups that were analyzed.

The explanatory variables of the participation equation are essentially household demographic and economic characteristics. In defining these characteristics, we adopted the Census definition of the household as the group of individuals who live in the dwelling unit. This definition deviates from the unit definition that was used in the eligibility and benefit simulation process, described in the first section of this chapter. In defining eligibility, we attempted to construct a unit that resembles the food stamp unit, based on the information available in SIPP. However, the attempt to replicate the food stamp unit failed in one important respect--this definition is not meaningful for households that currently do not participate in the FSP nor

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TABLE II.2

COMPARISON OF SELECTED CHARACTERISTICS
OF FSP PARTICIPANTS
IN THE SIPP AND IQCS DATA BASES

	SIPP Mean or Percentage	IQCS Mean or Percentage	Percentage Difference
Age of Reference Person	43.9	42.2	+ 4.0%
Race of Reference Person (Percentage of Blacks)	35.6%	36.4%	- 2.2
Number of Persons	2.80	2.67	+ 4.8
Number of Children	1.44	1.32	+ 9.0
Presence of Children	61.8%	59.2%	+ 4.4
Gross Income	$417	$397	+ 5.0
FSP Benefit Amount	$119	$116	+ 2.6
Receiving Public Assistance	69.7%	64.3%	+ 8.4
Reporting Earnings	21.1%	19.6%	+ 7.6

SOURCE: SIPP estimates are obtained from the August 1985 Food Stamp Eligibility File. IQCS estimates are obtained from the August 1985 analysis file of the Integrated Quality Control System.

NOTES: All the estimates presented in the table use the food stamp unit as a unit of analysis.

receive cash assistance. For these households, the food stamp unit definition used in the eligibility simulation coincides with the Census household.

The choice to be made in the context of a multivariate analysis of participation is whether one should use the characteristics of the simulated food stamp unit, with the limitations described above, or the characteristics of the Census household, even when the simulated food stamp unit differs from it. We believe that the latter choice, although far from ideal, is less problematic. The main problem with using the characteristics of the simulated food stamp unit is the asymmetric treatment of the observations based on a criterion that is correlated with the dependent variable (that is, participation status). Such asymmetric treatment could cause some characteristics to appear to affect participation only because they have been defined differently for participants than for nonparticipants.

The first group of household characteristics consists of the demographic characteristics of the household reference person (age, race and Spanish origin, and level of education) and of the household itself (the number of persons and the presence of children). The relationship between these variables and participation in the FSP is discussed in Chapter III. The second group of variables consists of economic characteristics: total household income (expressed as a percentage of the poverty threshold), the presence of any earnings, assets ownership, and public assistance receipt. The relationship between these variables and FSP participation is discussed in Chapter IV. Finally, the relationship between participation and the amount of benefits for which the household is eligible is explored in Chapter V.

Some of the explanatory variables described earlier are endogenous--that is, they are determined simultaneously with participation. For example, the decision to work or to participate

association between observable characteristics and participation when all other characteristics are held constant. However, their inclusion is a problem if the purpose is to estimate "behavioral responses"--that is, to predict how participation would change in response to an exogenous change in a given explanatory variable. Among the explanatory variables introduced above, the only one that could be used for policy simulation is the benefit variable. For this reason, the analysis of this variable requires special attention, and we devote a separate chapter to it (Chapter V).

All of the explanatory variables enter into the participation equation in *discrete intervals*. For example, the age of the reference person is specified in five intervals, ages 15 to 29, 30 to 39, 40 to 59, 60 to 69, and above 70. We used discrete intervals for variables that are continuous, for two reasons. First, they provide a convenient way to detect the presence of nonlinearities in the effects of the explanatory variables. For example, the effect of additional education can be very different at low levels of education than at higher levels. A discrete specification also facilitates detecting nonmonotonic effects--that is, effects that are positive in some ranges and negative in others. Second, a discrete specification provides parameter estimates that can readily be used to compute predicted participation rates. For example, we present the effect of the age of the reference person on participation by computing the participation rate for each of the five age groups, holding all other variables constant at their sample means. Section D contains a more detailed discussion on how the results are presented in the report.

We identified four *demographic subgroups* of the food stamp population: (1) households that contain an elderly member, (2) households that contain a disabled member, (3) female-headed households with children, and (4) two-parent households with children. The participation analysis in the report applies both to the overall population and to each of the four subgroups. The four subgroups are not defined as mutually exclusive. For example, a household can be counted not only as an elderly household but also as a female-headed household. Table II.3 shows the extent to which the four groups overlap.

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It is interesting to note that households that contain a disabled member overlap with other subgroups to the greatest extent: approximately 50 percent of them are also classified in another subgroup. Households that contain an elderly member overlap much less; only about 10 percent of them are classified elsewhere.

D. PRESENTATION OF THE ESTIMATION RESULTS

The estimation results from the participation equations for the different subgroups are presented in the report in two different formats. First, in the main body of the report, we present participation rates for an "average" household, computed on the basis of the coefficients of the participation equation. We define these rates as "predicted," or "regression-adjusted," participation rates. Second, in Appendix B, we present the coefficients of the participation equation with their associated t-statistics. Because we occasionally use the t-statistics in the main body of the report, the concluding part of this section describes how they are presented in the tables in Appendix B.

In addition to the estimation results from the participation equations, the tables in the text report the corresponding "univariate" participation rates--that is, the rates computed simply by dividing the number of participating households by the number of eligible households.[11] Comparing predicted and univariate participation rates can provide insights that cannot be obtained by analyzing each set of participation rates separately.

We now discuss in more detail how we present predicted participation rates and probit coefficients in the report. The predicted participation rates are computed on the basis of the estimated coefficients in the following way. Let us consider a variable with three different values --for example, the education of the household head--categorized at the following levels: less than

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[11]These univariate rates differ from the participation rates computed by Doyle (1990), in which the count of participants (the numerator) is obtained from administrative data, and the count of eligibles (the denominator) is obtained from SIPP.

TABLE II.3

OVERLAP BETWEEN FOUR DEMOGRAPHIC SUBGROUPS
OF THE FSP-ELIGIBLE POPULATION
(unweighted counts)

	Households Counted as:			
Also Counted as:	Containing an Elderly Member	Containing a Disabled Member	Female-Headed with Children	Two-Parent with Children
Containing an Elderly Member	-	57 (17.2%)	53 (5.6%)	67 (10.0%)
Containing a Disabled Member	57 (4.2%)	-	64 (6.8)	53 (7.9)
Female-Headed Households with Children	53 (3.9)	64 (19.3)	-	0 (0.0)
Two-Parent Households with Children	67 (5.0)	53 (16.0)	0 (0.0)	-
Total	1346	331	940	668

SOURCE: August 1985 Food Stamp Eligibility File.

NOTES: The numbers in parentheses are percentages of the total.

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high school, high school, and more than high school. Of the three values, two (say, the two highest values) enter into the participation equation as (0,1) dummy variables. Therefore, we obtain two estimated coefficients for education: B_1, the marginal impact of high school versus less than high school, and B_2, the marginal impact of more than high school versus less than high school. In computing the predicted participation rates for the three levels of education, we must fix all the other characteristics at some common value, in order to eliminate the effect of the other characteristics on the participation rates. We fix these characteristics at their sample means. Given this setup, the predicted, or regression-adjusted, participation rates for the three levels of education are computed as follows:

$$(6) \quad PR_0 = \phi(ZB)$$

$$PR_1 = \phi(ZB + B_1)$$

$$PR_2 = \phi(ZB + B_2)$$

where Z is the vector of means *excluding* the education dummies, B is the corresponding vector of coefficients, and the B_i's are the coefficients on the education dummies. $\phi(\ )$ represents the cumulative distribution function of the standard normal distribution, so that $\phi(ZB)$ represents the probability of participating in the program for a household with characteristics Z and headed by a person without a high school diploma. Since all variables are entered in discrete rather than continuous form, predicted participation rates can easily be computed with the procedure outlined above.

To increase the readability of the results, the tables that report the predicted participation rates also report the *deviation* between the predicted participation rate at each discrete level of the explanatory variable and the overall predicted participation rate. The purpose of this column is to convey to the reader an immediate idea of the direction and size of the effect that the

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variable under consideration has on the probability of participation. The overall predicted participation rate is computed at the sample mean values for *all* of the explanatory variables.

One drawback to presenting predicted participation rates rather than presenting the probit coefficients directly is that the standard errors cannot similarly be displayed, so that the difference between the rates at different levels of a given explanatory variable cannot be tested directly for statistical significance. To address this lack of information, Appendix B presents the probit coefficients and the associated t-statistics. These coefficients are presented as the *marginal effects* on the probability of participation,[12] rather than as "raw" probit coefficients (that is, the coefficients in the B vector in the participation equation). These marginal effects represent the (percentage) difference in the probability of participation associated with a unit difference in a given explanatory variable, evaluated at the sample mean of all the other explanatory variables.

One point should be noted about how the probit coefficients are presented in Appendix B, since this presentation deviates from how these results are traditionally reported. We present the coefficients from several algebraically equivalent specifications of the probit equation. However, each specification uses a different set of values for each characteristic considered.[13] This apparently confusing approach has an important motivation. It is intended to overcome a drawback to using variables in discrete rather than continuous form--the fact that the pattern of statistical significance of the coefficients of a discrete variable depends on the excluded category for that variable.

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[12]Deriving marginal effects entails multiplying the "raw" probit coefficients by the standard normal density evaluated at the sample mean. More formally, the coefficients presented in Appendix B are equal to $\phi(XA) * B_i * 100$, where $\phi( )$ is the density of the standard normal. Details on how marginal impacts are derived from discrete-choice models are presented in Maddala (1983).

[13]More precisely, each specification uses a different excluded category for each categorical variable. Changing the excluded category of a categorical variable does *not* have any effect on the coefficients of the other categorical variables.

This point is better illustrated by an example. Returning to the three education categories referred to above, let us conjecture that the only statistically significant difference in participation is between the two extremes: less than high school and more than high school. If the participation equation is specified in such a way that the excluded category is the intermediate one (high school), the t-statistics will suggest that there is no significant difference in participation between each of these two extreme categories and the intermediate category. This result *cannot* be interpreted as evidence that education does not have any statistically significant impact on participation among the eligible population. If less than high school were the excluded category, the t-statistic on the more-than-high-school dummy would reveal a statistically significant difference.

The solution presented in Appendix B obviates the arbitrariness in choosing the excluded categories. This solution consists of estimating a number of algebraically equivalent alternative specifications, all of which generate the same predicted participation rates. However, each specification may generate a different pattern of statistical significance of the coefficients. When the analysis required a test of the difference between the participation rates computed at any two discrete levels of the same variable, we used the results from the relevant specification in Appendix B.

III. FSP PARTICIPATION AND THE DEMOGRAPHIC
CHARACTERISTICS OF HOUSEHOLDS

In this chapter, we examine how demographic characteristics affect participation among FSP-eligible households. The analysis is conducted for all eligible households and for the following four subgroups of the eligible population: households with an elderly person, households with a disabled member, female-headed households with children, and two-parent households with children. The comparison of univariate and regression-adjusted rates indicates the extent to which the observed relationship between FSP participation and a given household characteristic is due to the net effect of the characteristic itself, and the extent to which it is due to other characteristics that are correlated with the one being examined.

The tables in this chapter are arranged in groups of three (and are located at the end of the chapter): the first table in each group (A) presents participation rates among the entire FSP-eligible population; the second table (B) presents rates among households that contain an elderly member and those that contain a disabled member; and the third table (C) presents rates among female-headed households with children and two-parent households with children.

In addition to participation rates calculated at different levels of a given characteristic (e.g., different age levels or income levels), each table includes the overall rate for the group(s) examined in that table. The overall rate provides a term of comparison; the tables present the deviations between the participation rates calculated at each value of a given characteristic and the overall rate. Since the four demographic groups exhibit substantially different overall rates of participation, we begin with a comparison among overall rates.

According to 1985 SIPP data, 44.2 percent of all eligible households participate in the FSP. The overall rate predicted on the basis of regression coefficients for an "average" household is only slightly lower, 43.7 percent. At first glance, these rates seem quite low; however, it is

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important to keep in mind that the rates reported in this paper are based *entirely* on survey data, and are thus substantially lower than those based on both administrative and survey data, as was discussed in Chapter II. The corresponding household participation rate for all eligible households in August 1985 reported in Doyle (1990) is 59.4 percent—15 percentage points higher than the overall univariate rate based solely on survey data.

The overall rates for the four demographic subgroups vary substantially from the rate for all eligible households. The overall rate among households that contain an elderly person is substantially lower than the overall rate among the total eligible population (approximately 30 percent, compared with 44 percent), and the rate among female-headed households with children is much higher (79 percent versus 44 percent). Both of these findings are consistent with previous research. Among households with a disabled member, the overall rate is about 12 percentage points higher than the overall rate among all eligible households,[14] while the overall rate among two-parent households with children is essentially equal to the overall rate among all eligible households. The regression-adjusted overall rates tend to coincide with their univariate counterparts, with the exception of female-headed households. Among this group, the predicted rate for an average household is significantly higher than the univariate rate (78.9 percent compared with 69.6 percent).

We now turn to the rates of participation by demographic characteristics. The first two sections of this chapter examine differences in participation rates by, respectively, the age, education, and race/ethnicity of the household reference person. The reference person in SIPP is defined as the first household member mentioned to the interviewer as the owner or renter of

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[14]This finding differs from the finding presented in Doyle (1990), in which the overall rate among households with a disabled person is several percentage points lower than the rate among all households (46.7 percent, compared with 59.4 percent). This difference is due to the fact that the administrative data used in the numerator of Doyle's participation rates capture only those disabled persons who receive SSI. In contrast, SIPP also captures disabled individuals who receive Social Security or Veteran's benefits due to their disability.

the sample unit. If no cash payments are made for rent, then the reference person is the first household member mentioned who is 18 years or older.

It is conceivable that the other household members may not have the same characteristics as the reference person, so that the reference person would not be "representative" of the demographic characteristics of the other members. However, when examining the relationship between FSP participation and person-level demographic characteristics (such as race or education), one is forced either to choose the characteristics of one household member or to construct some average measure for the household. We have chosen to follow the usual approach of examining the characteristics of the household reference person.

A. AGE OF THE REFERENCE PERSON

Tables III.1A, B, and C present the univariate and regression-adjusted participation rates disaggregated by the age of the reference person. We discuss the results separately for each demographic group, starting with the entire eligible population.

1. All Eligible Households

Among the overall eligible population, two age groups participate at rates that differ substantially from the overall rate of 44 percent: households in which the reference person is 30 to 39 years participate at a higher rate (53 percent), and households in which the reference person is 70 years or older participate at a much lower rate (31 percent). The participation rates of the other three age groups (that is, households in which the reference person is 15 to 29, 40 to 59, or 60 to 69 years old) are much closer to the overall rate. Moreover, the t-statistics reported in Table B.1 suggest that the differences in participation among these groups are not statistically significant.

The pattern of participation shown by the regression-adjusted rates does not differ dramatically from the pattern implied by the univariate rates. However, one important

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discrepancy should be noted. The univariate participation rate for households headed by a 60 to 69 year-old is 10-15 percentage points lower than the rate for households headed by a younger person. This difference almost disappears with the regression-adjusted rates, leaving only the households headed by a person 70 years of age or older with a substantially lower participation rate.

2. Households with an Elderly Member

In approximately 95 percent of households that *contain* an elderly member, one of the elderly persons in the household is also reported as the household head. Therefore, very few households that contain an elderly person are headed by a person younger than 60 years of age. To analyze the pattern of participation by the age of the reference person among households that contain an elderly person, we collapsed the younger age categories into one category--the reference person is younger than age 60.

Table III.1B shows that regression-adjusted and univariate participation rates exhibit different patterns. Households in which the reference person is younger than age 60 have a substantially higher *univariate* participation rate than those in which the reference person is 60 to 69 years or 70 years or older. When the non-age characteristics are held constant in the regression-adjusted rates, the difference between the younger than 60 and 60 to 69 years of age categories is no longer statistically significant (Table B.2). By contrast, households whose reference person is 70 years or older participate at a significantly lower rate, approximately 27 percent.[15]

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[15]The adjusted rates for the two elderly groups differ between Table III.1B and Table III.1A due to the different mean values of the non-age characteristics. The rates in Table III.1B are computed for an average elderly household, and those in Table III.1A for an average household.

The major implication of this analysis is that the elderly FSP-eligible population should not be seen as a homogeneous group as far as participation is concerned: only the older group among the elderly population is affected by particularly low rates of participation.

3.   Households with a Disabled Member

Due to the small number of households with a disabled member in which the reference person is older than 60 years of age, we collapsed the two highest age categories into one category, 60 years and older.[16] Both the univariate and the predicted rates indicate that participation among households with a disabled member declines with the age of the reference person. Participation among the two youngest age groups is well above 60 percent, declines to about 50 percent for the 40- to 59-year-old group (which comprises the majority of households with a disabled member), and declines further to nearly 40 percent for the elderly. However, the difference between the latter two groups is not statistically significant.

4.   Female-Headed Households with Children

The participation rates among female-headed households with children disaggregated by the age of the reference person exhibit an interesting pattern. The regression-adjusted rates clearly cluster around two levels: above 80 percent among households whose reference person is younger than age 40, and less than 70 percent for households whose reference person is older.

Although the differences within the two broad groups are not statistically significant (see Table B.4), it appears that female-headed households with children may exhibit different participation behavior when the reference person is younger than age 40 than when she is older than age 40. The situations of these two types of households may be very different: the households with a young reference person (that is, younger than age 40) are more likely to be

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[16]We made the same aggregation for female-headed and two-parent households with children.

mothers who live alone with very young children, while the group with an older reference person may be a young family that lives with a grandmother or a family in which an older mother has school-age children.

5.   Two-Parent Households with Children

If one were to consider only the univariate participation rates, one would conclude that participation among two-parent households with children increases steadily with the age of the reference person, ranging from 37 percent for households headed by a 15 to 29 years old, to 58 percent for households headed by a person 60 years of age or older. The regression-adjusted rates offer a different picture, which is more in line with the results obtained for other demographic groups. As was true among all eligible households, the participation rate among two-parent households in which the reference person is 30 to 39 years old is significantly higher than for the two adjacent age groups. An unexpected result is the higher participation rate among households whose reference person is older than age 60. However, due to the small sample size of this group, this rate does not differ statistically from the rate among any other age group (Table B.5).

B.   THE EDUCATION AND RACE/ETHNICITY OF THE REFERENCE PERSON

Tables III.2A, B, and C explore the differences in participation by the education and the race and Spanish origin of the reference person. We first discuss the differences by education for both the eligible population and for the four demographic subgroups, and then focus on the different participation levels by the race and ethnicity of the reference person.

1.   Education

As found consistently by previous research, the better educated the household reference person, the less likely the household is to participate in the FSP. Among all eligible households,

participation declines monotonically with the education of the reference person. The largest difference exists between households in which the reference person has more than a high school education and those in which he or she has exactly a high school education (11 percentage points). A smaller, although still statistically significant, difference exists between the latter group and the group without a high school education (5 percentage points). One interesting point to note is that the univariate rates follow almost the same pattern as the adjusted rates, suggesting that the differences shown by the univariate rates are truly an effect of the reference person's education on the probability of participation, rather than simply a reflection of differences in income.

The pattern of participation by the education of the reference person among households with an elderly or a disabled member is similar to the participation pattern among all households (that is, participation declines monotonically by education), but the variation among the rates at the different levels of education is much smaller for these two subgroups and is never statistically significant. The range between the highest and lowest rates is about 4 percentage points for households with an elderly member and 8 percentage points for households with a disabled member. It should be noted that the sample sizes for the more-than-high-school category are very small, making it difficult to detect any significant effect.

Among female-headed and two-parent households, the nonmonotonic pattern of participation by the education of the reference person might at first seem to contradict the decreasing pattern found for the other groups and for the overall population. However, the only statistically significant differences--between less than high school and high school for female-headed households and between high school and more than high school for two-parent households--are in line with the overall decreasing pattern observed before.

2. Race and Ethnicity

A comparison of the participation patterns by the race and Spanish origin of the household reference person yields some interesting results. Among all households, those whose reference person is black non-Hispanic (hereafter referred to as black households) are more likely to participate than households whose reference person is white non-Hispanic (hereafter referred to

To summarize, net differences in participation between black and white households seem to exist only among households that contain a disabled member. A small but significant difference between the two racial groups is found in the overall population. Hispanic households tend to have the same participation rates as white non-Hispanic households, the only exception to which is a much lower participation among two-parent households.

C. HOUSEHOLD SIZE AND THE PRESENCE OF CHILDREN

Tables III.3A through III.3C examine differences in participation by the size of the household. Table III.3A also examines participation rates among the total eligible population by the presence of children younger than age 18. We do not examine variations in the participation rate by the presence of children for the four subgroups, because two of the groups—female-headed households and two-parent households—are defined on the basis of the presence of children, and the other two groups contain only a small number of households with children.

1. Presence of Children

As shown in Table III.3A, the presence of children younger than age 18, independent of other household characteristics (such as household size), does not have a substantial effect on the participation rate. The univariate rates among households with and without children show a very large difference (26 percentage points), but only a small difference remains when other characteristics are held constant (6 percentage points). The large difference among the univariate rates is probably due largely to the high correlation between the receipt of public assistance and the presence of children younger than age 18. According to SIPP, 77 percent of the FSP-eligible households that were receiving public assistance in August 1985 were receiving Aid to Families with Dependent Children (Doyle, 1990).

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2. Household Size

With few exceptions, FSP participation increases with the size of the eligible household. In fact, among the overall eligible population, a 20 percentage point difference exists between the regression-adjusted participation rates among one-person and three-person households.

FSP participation also increases with size among households with a disabled member, ranging from 46 percent for one-person households to over 69 percent for larger (four-person and larger) households. Although the regression-adjusted participation rate is low among three-person households with a disabled member relative to two- and four-person households with a disabled member, these differences are not statistically significant (as shown in Table B.3). Among female-headed households with children,[17] participation increases monotonically, but a much smaller gap exists between the rates for small and large households. Two-parent households show a reverse pattern (that is, participation declines with household size), but none of the differences is statistically significant.

The preceding discussion shows that one-person households participate at lower rates than do larger households. Table III.3B shows that the majority of households with an elderly member (60 percent) contain only one person.[18] In contrast, only 32 percent of households with a disabled member and 34 percent of all eligible households are one-person households. This predominance of one-person households among the elderly raises several questions. Is the low participation rate among households with an elderly member due primarily to an unusually low tendency by persons who live alone to participate in the FSP? Alternatively, is the low participation rate among persons who live alone due primarily to a low tendency by the elderly to participate in the FSP? Which of the two effects prevails in determining the very low

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[17]By definition, there are no one-person female-headed households with children, and no two-parent households with fewer than three persons.

[18]The converse is also true: 66 percent of eligible persons who live alone are elderly.

participation rate among older persons who live alone? We conclude this section with a more in-depth discussion of the role of household size and elderly status in determining participation in the FSP.

In order to answer these questions, we estimated a variant of the participation equation on which the results presented in this chapter are based. We estimated a participation equation for the overall eligible population, including two dummy variables among the regressors—one indicating whether the household contains an elderly member, and another indicating whether the household contains one person or more than one person. We also included an interaction term (that is, the product of the two dummy variables). The other regressors were the same as those used thus far.[19] The estimated coefficients of this equation allow us to compute separate regression-adjusted participation rates for nonelderly, multi-person households; elderly, multi-person households; nonelderly, one-person households; and elderly, one-person households. The adjusted rates are presented in Table III.4. Before we discuss these results, it is important to mention that, while the two separate characteristics (a household headed by an elderly person and a one-person household) have strong and significant negative effects on participation, the interaction term has a very small and insignificant positive coefficient, indicating that being a one-person household *and* being an elderly person do not reduce participation any further than does either of the two characteristics separately.

A comparison among the adjusted rates in Table III.4 provides some insights into the relative importance of the "elderly effect" versus the "living alone effect" in reducing the probability of FSP participation. Table III.4 shows two complementary measures of the elderly effect—one for multi-person households (the difference between the second and third lines, 13.6 percentage points) and one for one-person households (the difference between the fourth and

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[19]Of course, the exception is that the age of the reference person and household size have been substituted by the two dummy variables just described.

fifth lines, 9.3 percentage points). The measures of the living-alone effect are derived similarly— one for nonelderly households (the difference between the second and fourth lines, 20.8 percentage points) and one for elderly households (the difference between the third and fifth lines, 16.5 percentage points). Overall, the living-alone effect is larger than the elderly effect, although the latter is also substantial.

These simple calculations suggest an answer to the questions posed above. Something idiosyncratic about households headed by an elderly person seems to lead to their low FSP participation rate. Ponza and Wray (1990) found that elderly persons do not participate in available USDA programs, including the FSP, because they feel that they do not need the assistance or would rather rely on other sources, because they dislike certain features of the programs (e.g., the application process, the location of the program office, or the form of the program benefit), because they believe that they are ineligible, or for some combination of all these reasons. In particular, they found that many elderly persons do not participate in the FSP because they are entitled only to a small benefit amount.

Independent of the elderly effect, persons who live alone also seem to have an even lower propensity to participate in the FSP. These persons might be more likely to rely on other households for their food consumption and meal preparation, so that the in-kind benefits provided by the FSP would be relatively less valuable to them. The attempt in SIPP to include "money received from relatives and friends" among the sources of income might not be sufficient to capture the complexity of inter-household transfers of resources, most of which might be in-kind (such as health insurance coverage, the provision of clothing and transportation, and food-consumption sharing).[20] Therefore, on average, one-person households might have more

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[20]Over 25 percent of all FSP-eligible nonelderly, nondisabled individuals who live alone reported zero income in August 1985.

available resources than are revealed by their income and assets, which could partially explain their very low rate of FSP participation.

An alternative explanation of this phenomenon that can easily be extended to small households relies on the importance of the fixed costs of participation. More specifically, both monetary and nonmonetary costs are involved in applying for benefits and in obtaining the coupons every month. At the same time, the size of the benefit increases with the size of the household, everything else held constant.[21] Small households are thus more likely to feel that the size of the benefit is insufficient to compensate for the fixed costs of participation. Whether the latter is a "size effect" or a "benefit effect" is an important question, and one difficult to answer, since the size of the benefit depends strictly on the size of the household.[22] Chapter V discusses this issue more extensively.

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[21]More precisely, the size of the benefit increases with the size of the food stamp unit, but the distinction is immaterial for this discussion.

[22]More precisely, it is the guarantee amount (i.e., the benefit for a household with zero net income) that depends strictly on the size of the food stamp unit.

TABLE III.1A

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS,
BY
THE AGE OF THE REFERENCE PERSON

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Overall Participation Rate	43.7%	0.0	44.2%	0.0	3,559
Age of Reference Person:					
15 to 29 years	47.0	+ 3.3	51.9	+ 7.7	805
30 to 39 years	53.3	+ 9.6	52.6	+ 8.4	713
40 to 59 years	45.2	+ 1.5	47.8	+ 3.6	769
60 to 69 years	43.1	- .6	37.9	- 6.3	502
70 years or older	30.9	-12.8	26.9	-17.2	770

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

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TABLE III.18

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS
WITH ELDERLY OR DISABLED MEMBERS,
BY
THE AGE OF THE REFERENCE PERSON

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Households with an Elderly Person					
Overall Participation Rate	30.2%	0.0	32.2%	0.0	1,346
Age of Reference Person:					
Less than 60 years	31.1	+ .9	47.2	+15.0	74
60 to 69 years	35.6	+ 5.4	37.9	+ 5.7	502
70 years or older	26.8	- 3.4	26.9	- 5.3	770
Households with a Disabled Person					
Overall Participation Rate	55.8%	0.0	55.7%	0.0	331
Age of Reference Person:					
15 to 29 years	65.7	+ 9.9	63.2	+ 7.5	36
30 to 39 years	69.0	+13.2	63.2	+ 7.5	62
40 to 59 years	52.1	- 3.7	53.1	- 2.6	193
60 years or older	42.9	-13.0	47.8	- 7.9	40

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

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TABLE III.1C

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FEMALE-HEADED AND TWO-PARENT
FSP-ELIGIBLE HOUSEHOLDS WITH CHILDREN,
BY
THE AGE OF THE REFERENCE PERSON

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Female-Headed Households with Children					
Overall Participation Rate	78.9%	0.0	69.6%	0.0	940
Age of Reference Person:					
15 to 29 years	82.2	+ 3.3	77.3	+ 7.7	349
30 to 39 years	81.9	+ 3.0	68.5	- 1.0	335
40 to 59 years	69.2	- 9.7	58.0	-11.6	212
60 years or older	68.5	-10.4	65.3	- 4.2	44
Two-Parent Households with Children					
Overall Participation Rate	42.3%	0.0	41.0%	0.0	668
Age of Reference Person:					
15 to 29 years	36.8	- 5.5	36.7	- 4.2	207
30 to 39 years	48.8	+ 6.5	40.7	- .3	242
40 to 59 years	38.0	- 4.2	42.8	+ 1.8	176
60 years or older	50.7	+ 8.4	57.6	+16.6	43

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE III.2A

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS,
BY
THE EDUCATION, RACE, AND ETHNICITY OF THE REFERENCE PERSON

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Overall Participation Rate	43.7%	0.0	44.2%	0.0	3,559
Education of Reference Person:					
Less than high school	47.2	+ 3.5	47.9	+ 3.7	2,081
High school	42.4	- 1.3	43.6	- .6	1,018
More than high school	31.6	-12.1	29.3	-14.9	460
Race/Ethnicity of Reference Person:					
White non-Hispanic	42.7	- 1.0	37.5	- 6.7	2,195
Black non-Hispanic	47.7	+ 4.0	56.3	+12.1	963
Hispanic	39.8	- 3.9	50.4	+ 6.2	401

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE III.2B

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS
WITH ELDERLY OR DISABLED MEMBERS,
BY
THE EDUCATION, RACE, AND ETHNICITY OF THE REFERENCE PERSON

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Households with an **Elderly Person**					
Overall Participation Rate	30.2%	0.0	32.2%	0.0	1,346
Education of Reference Person:					
Less than high school	31.1	+ 1.0	34.5	+ 2.2	1,048
High school	26.9	- 3.3	25.5	- 6.7	209
More than high school	26.8	- 3.4	22.4	- 9.8	89
Race/Ethnicity of Reference Person:					
White non-Hispanic	28.8	- 1.4	27.0	- 5.2	913
Black non-Hispanic	33.9	+ 3.7	45.3	+13.0	338
Hispanic	30.6	+ .4	38.2	+ 5.9	95
Households with a **Disabled Person**					
Overall Participation Rate	55.8%	0.0	55.7%	0.0	331
Education of Reference Person:					
Less than high school	58.1	+ 2.3	60.1	+ 4.4	210
High school	52.6	- 3.2	50.4	- 5.3	87
More than high school	49.7	- 6.1	43.7	-12.0	34
Race/Ethnicity of Reference Person:					
White non-Hispanic	50.1	- 5.7	49.7	- 6.0	194
Black non-Hispanic	65.6	+ 9.8	66.2	+10.5	104
Hispanic	57.4	+ 1.6	57.7	+ 1.9	33

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented
in Appendix B; the univariate participation rates are based on weighted sample estimates. The
deviations from the overall rates are measured in percentage points.

TABLE III.2C

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FEMALE-HEADED AND TWO-PARENT
FSP-ELIGIBLE HOUSEHOLDS WITH CHILDREN,
BY
THE EDUCATION, RACE, AND ETHNICITY OF THE REFERENCE PERSON

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Female-Headed Households with Children					
Overall Participation Rate	78.9%	0.0	69.6%	0.0	940
Education of Reference Person:					
Less than high school	82.4	+ 3.5	76.4	+ 6.8	484
High school	73.9	- 5.0	63.8	- 5.8	345
More than high school	77.7	- 1.2	59.3	-10.2	111
Race/Ethnicity of Reference Person:					
White non-Hispanic	78.8	- .1	64.2	- 5.4	418
Black non-Hispanic	79.3	+ .4	72.7	+ 3.1	383
Hispanic	77.9	- 1.0	76.7	+ 7.1	139
Two-Parent Households with Children					
Overall Participation Rate	42.3%	0.0	41.0%	0.0	668
Education of Reference Person:					
Less than high school	41.9	- .4	44.8	+ 3.8	327
High school	47.6	+ 5.3	39.9	- 1.1	241
More than high school	31.4	-10.9	31.1	- 9.8	100
Race/Ethnicity of Reference Person:					
White non-Hispanic	44.7	+ 2.4	41.7	+ .8	434
Black non-Hispanic	45.0	+ 2.7	44.9	+ 4.0	113
Hispanic	31.7	-10.6	34.3	- 6.6	121

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

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TABLE III.3A

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS,
BY
THE SIZE OF THE HOUSEHOLD AND THE PRESENCE OF CHILDREN

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Overall Participation Rate	43.7%	0.0	44.2%	0.0	3,559
Presence of Children Under 18:					
Not present	40.6	- 3.1	31.6	-12.6	1,850
Present	47.1	+ 3.4	57.6	+13.4	1,709
Size of Household:					
1 person	34.5	- 9.2	28.2	-16.0	1,222
2 persons	45.4	+ 1.7	45.6	+ 1.4	747
3 persons	53.0	+ 9.3	57.4	+13.2	559
4 persons	48.4	+ 4.7	55.3	+11.1	464
5 or more persons	48.8	+ 5.1	56.0	+11.8	567

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE III.38

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS
WITH ELDERLY OR DISABLED MEMBERS,
BY
THE SIZE OF THE HOUSEHOLD

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Households with an Elderly Person					
Overall Participation Rate	30.2%	0.0	32.2%	0.0	1,346
Size of Household:					
1 person	25.7	- 4.5	26.8	- 5.4	812
2 persons	31.6	+ 1.5	32.5	+ .3	320
3 persons	43.1	+12.9	47.3	+15.1	94
4 persons	48.5	+18.3	61.6	+29.4	48
5 or more persons	51.6	+21.4	63.4	+31.1	72
Households with a Disabled Person					
Overall Participation Rate	55.8%	0.0	55.7%	0.0	331
Size of Household:					
1 person	46.2	- 9.6	46.3	- 9.4	105
2 persons	57.4	+ 1.6	56.6	+ .9	94
3 persons	49.0	- 6.8	56.1	+ .4	49
4 persons	69.9	+14.1	68.4	+12.7	35
5 or more persons	69.1	+13.2	68.8	+13.1	48

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

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TABLE III.3C

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FEMALE-HEADED AND TWO-PARENT
FSP-ELIGIBLE HOUSEHOLDS WITH CHILDREN,
BY
THE SIZE OF THE HOUSEHOLD

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Female-Headed Households with Children					
Overall Participation Rate	78.9%	0.0	69.6%	0.0	940
Size of Household:					
2 persons	71.6	- 7.3	63.9	- 5.7	227
3 persons	78.2	- .7	67.5	- 2.1	293
4 persons	82.2	+ 3.4	77.0	+ 7.4	205
5 or more persons	83.2	+ 4.3	72.3	+ 2.7	215
Two-Parent Households with Children					
Overall Participation Rate	42.3%	0.0	41.0%	0.0	668
Size of Household:					
3 persons	49.1	+ 6.8	41.4	+ .4	139
4 persons	40.6	- 1.7	35.1	- 5.9	213
5 or more persons	40.5	- 1.8	44.8	+ 3.8	316

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE III.4

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS,
BY
THE SIZE OF THE HOUSEHOLD AND THE PRESENCE OF AN ELDERLY MEMBER

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Overall Participation Rate	43.7%	0.0	44.2%	0.0	3,559
Size and Elderly Status of the Household:					
Non-elderly, multiperson	55.2	+11.5	55.6	+11.4	1,877
Elderly, multiperson	41.6	- 2.1	40.1	- 4.1	460
Non-elderly, one-person	34.4	- 9.3	30.6	-13.6	410
Elderly, one-person	25.1	-18.6	26.8	-17.4	812

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from probit coefficients that are not presented elsewhere; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

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IV. FSP PARTICIPATION AND THE ECONOMIC CHARACTERISTICS OF HOUSEHOLDS

This chapter augments our analysis of FSP participation by household characteristics in Chapter III: here, we examine differences in participation in the FSP by the economic characteristics of households. In particular, we examine differences in household participation rates by (1) the ratio of the household's income to the poverty threshold, (2) whether the household receives public assistance, (3) whether the household has earnings, and (4) whether the household has positive assets.

As in Chapter III, this analysis applies first to all eligible households (Table A in each set of tables) and then to the following four demographic subgroups of the eligible population: households with an elderly member and households with a disabled member (Table B in each set), and female-headed and two-parent households with children (Table C in each set). Again, all tables appearat the end of the chapter.

A. HOUSEHOLD INCOME AS A PERCENTAGE OF THE POVERTY THRESHOLD

Tables IV.1A, B, and C present FSP participation rates disaggregated by household income relative to the poverty threshold. Because the FSP participation of households with zero reported income differs substantially from the FSP participation of households with positive incomes, we discuss their participation behavior separately.

1. Zero-Income Households

A priori, one would expect that households with no income would participate at relatively high rates, since they apparently have no other resources. However, previous research based on survey data has found that estimated participation rates among households that report no income are surprisingly low. For example, using data from the 1979 Income Survey Development

Program (ISDP), Czajka (1981) found that the univariate participation rate among households with zero monthly gross income was almost 26 percentage points lower than the overall rate among households, and 38 points lower than the rate among households whose incomes were 1 to 50 percent of the poverty threshold (4.6 percent, compared with 30.4 percent and 42.7 percent, respectively).[23]

Our findings on zero-income households are somewhat less dramatic. First, we find that a lower proportion of all eligible households report zero income: only 4.5 percent of the eligible population reported zero income, compared with about 10 percent of the sample of the eligible households examined by Czajka. This proportion is almost zero among households with an elderly member, while by definition none of the households with a disabled member has zero income.[24] The frequency of zero reported income is also rare among female-headed households (2.1 percent), while it is close to the overall average among two-parent households (4.6 percent). This finding implies that the bulk of zero-income households comprise households that are excluded from the four demographic subgroups. In fact, 47.5 percent of all zero-income households constitute individuals who live alone, are younger than age 60, and are not disabled.

The univariate rate of participation among zero-income households is well below the average for all groups, and it is always below 30 percent.[25] However, while Czajka found that only 4.6 percent of eligible households participate in the FSP, we find that 25 percent of these households participate. When the effects of other variables are removed through regression adjustments, we obtained a participation rate for zero-income households that is only a few

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[23]These figures are weighted averages of the univariate participation rates calculated for the three months of the ISDP examined by Czajka.

[24]Disabled persons are defined as those individuals who collect SSI, Social Security, or Veteran's benefits due to their disability.

[25]Among the nonelderly, nondisabled individuals who live alone, the univariate participation rate is 25.5 percent.

percent of the poverty line, which is evident (and statistically significant) among households that contain an elderly member (Table IV.1B). It is difficult to rationalize why participation is highest for the "51 to 100 percent" category (38.4 percent), declines for the contiguous "101 to 130 percent" category (19.1 percent), and then rises significantly for the next bracket "above 130 percent" (27.9 percent). This pattern is also observed among the univariate rates for elderly households. Actually, the adjustment due to the regression does very little to eliminate it. Due partly to the erratic trend among the elderly, the pattern for all households also shows a nonmonotonic trend; the participation rate is lowest among households in the "100 to 130 percent" category (28.1 percent), and it increases to 37.4 among households in the highest income bracket.

Among the three remaining demographic subgroups--households with a disabled member (Table IV.2B) and female-headed and two-parent households (Table IV.2C)--a negative relationship clearly exists between FSP participation and household income. When regression-adjusted estimates are considered, the difference between the participation rate among the "1 to 50 percent" of poverty category and the rate among the "above 100 percent" category remains substantial. This difference is approximately 20 percentage points for female-headed households, 30 percentage points for two-parent households, and 20 percentage points for households that contain a disabled member.

B.   THE RECEIPT OF PUBLIC ASSISTANCE

Not surprisingly, the receipt of public assistance is an extremely strong predictor of a household's participation in the FSP, as shown in Tables IV.2A through IV.2C.[26,27] Among

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[26]Previous research has unanimously found a strong positive relationship between participation in the FSP and participation in public assistance programs, as shown in Table A.1.

[27]In this report, public assistance refers to SSI, AFDC, general assistance, foster child care payments, and other welfare.

all eligible households, and among all four subgroups, households that receive public assistance are between two and three times more likely to participate in the FSP than are households that do not. In fact, the differential between the participation rates of households that receive public assistance and the rates of those that do not ranges from 56 percentage points among two-parent households to 29 percentage points among households that contain a disabled member. Among female-headed households that receive public assistance, the FSP participation rate is the highest among all those estimated in this report—over 90 percent.

It is interesting to note that the adjustment due to the regression does very little to reduce the differentials in FSP participation between households that receive and those that do not receive public assistance. For example, among all households, the univariate rates are 77 and 22 percent, respectively, while the regression-adjusted rates are 71 and 25 percent.

These results reinforce the notion that the decision to apply for food stamps is part of a more general decision to apply for the available "welfare package." Thus, the estimated effect of public assistance receipt in an FSP participation equation should not be interpreted in any "causal" sense; the receipt of public assistance does not necessarily lead to the receipt of FSP benefits. Rather, both are outcomes of some underlying process that is not observed, which might involve other decisions as well, such as those about living arrangements or labor-force participation.

C. THE PRESENCE OF EARNINGS

For the most part, previous research has found that households that receive earnings, or those in which the head of household is employed, are significantly less likely to participate in the FSP than are households that do not receive earnings, even when total income is held constant. We found some support for this finding, but not for all demographic groups. The effect of the presence of earnings is large and statistically significant only among female-headed households

with children, for which the participation rates among households with and without earnings are 69 and 84 percent, respectively. It is important to remember that the participation differential between female-headed households with and without earnings does not merely reflect the differential between those receiving and not receiving public assistance, because the receipt of public assistance is included in the regression.

Among households that contain a disabled person, the participation differential by the presence of earnings is large (16 percentage points), but, due to the small proportion of households that report any earnings, the difference is not statistically significant (Table B.3). Among households that contain an elderly member, the presence of earnings has no discernible impact on participation, and the proportion that report earnings is very small. Finally, the majority of two-parent households with children report earnings, and their regression-adjusted participation rate is higher, rather than lower, than the rate for those without earnings. However, this difference is not statistically significant (Table B.5).

D. THE PRESENCE OF ASSETS

Among all eligible households and among three of the subgroups (households that contain an elderly member, and female-headed and two-parent households with children), households with positive assets participate at rates that are significantly lower than those among households without assets.[28] In most cases, this differential is about 15 percentage points. The only apparent exception to this pattern is among households with a disabled member, for which the differential is smaller (6 percentage points) and not statistically significant.

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[28]In this report, we consider only assets that are countable under the FSP.

TABLE IV.1A

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS,
BY
HOUSEHOLD INCOME RELATIVE TO THE POVERTY THRESHOLD

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Overall Participation Rate	43.7%	0.0	44.2%	0.0	3,559
Household Income as a Percent of the Poverty Threshold:					
Zero	39.6	- 4.1	24.9	-19.3	160
1 to 50 percent	57.8	+14.1	68.0	+23.8	650
51 to 100 percent	48.9	+ 5.2	49.1	+ 4.9	1,564
101 to 130 percent	28.1	-15.6	20.5	-23.7	865
131 percent or more	37.4	- 6.3	44.1	- .1	320

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE IV.1B

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS
WITH ELDERLY OR DISABLED MEMBERS,
BY
HOUSEHOLD INCOME RELATIVE TO THE POVERTY THRESHOLD

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Households with an Elderly Person					
Overall Participation Rate	30.2%	0.0	32.2%	0.0	1,346
Household Income as a Percent of the Poverty Threshold:					
Zero	19.9	-10.3	14.8	-17.4	7
1 to 50 percent	29.5	- .7	31.4	- .8	79
51 to 100 percent	38.4	+ 8.2	39.4	+ 7.2	681
101 to 130 percent	19.1	-11.1	17.9	-14.4	383
131 percent or more	27.9	- 2.3	37.4	+ 5.2	196
Households with a Disabled Person					
Overall Participation Rate	55.8%	0.0	55.7%	0.0	331
Household Income as a Percent of the Poverty Threshold:					
1 to 50 percent	61.5	+ 5.6	66.8	+11.1	16
51 to 100 percent	62.7	+ 6.9	65.3	+ 9.6	174
101 to 130 percent	49.3	- 6.5	45.4	-10.3	90
131 percent or more	41.4	-14.4	34.9	-20.8	51

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE IV.1C

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FEMALE-HEADED AND TWO-PARENT
FSP-ELIGIBLE HOUSEHOLDS WITH CHILDREN,
BY
HOUSEHOLD INCOME RELATIVE TO THE POVERTY THRESHOLD

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Female-Headed Households with Children					
Overall Participation Rate	78.9%	0.0	69.6%	0.0	940
Household Income as a Percent of the Poverty Threshold:					
Zero	56.2	-22.7	29.6	-40.0	20
1 to 50 percent	86.5	+ 7.6	87.4	+17.8	320
51 to 100 percent	78.5	- .4	72.1	+ 2.5	401
101 percent or more	65.9	-13.0	36.7	-32.9	199
Two-Parent Households with Children					
Overall Participation Rate	42.3%	0.0	41.0%	0.0	668
Household Income as a Percent of the Poverty Threshold:					
Zero	45.5	+ 3.2	28.6	-12.3	31
1 to 50 percent	58.4	+16.2	57.2	+16.2	134
51 to 100 percent	45.4	+ 3.1	44.1	+ 3.1	267
101 percent or more	29.9	-12.4	29.9	-11.1	236

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE IV.2A

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS,
BY
THE RECEIPT OF PUBLIC ASSISTANCE AND
THE PRESENCE OF EARNINGS AND ASSETS

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Overall Participation Rate	43.7%	0.0	44.2%	0.0	3,559
Receipt of Public Assistance:					
Does not receive	25.5	-18.2	22.0	-22.2	2,094
Does receive	71.0	+27.3	76.9	+32.7	1,465
Presence of Earnings:					
No earnings	46.9	+ 3.2	48.7	+ 4.5	2,300
Earnings	37.9	- 5.8	35.6	- 8.6	1,259
Presence of Assets:					
No assets	50.0	+ 6.3	57.2	+13.0	1,996
Assets	35.9	- 7.8	27.1	-17.1	1,563

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE IV.2B

REGRESSION-ADJUSTED AND UNIVARIATE PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS WITH ELDERLY OR DISABLED MEMBERS, BY THE RECEIPT OF PUBLIC ASSISTANCE AND THE PRESENCE OF EARNINGS AND ASSETS

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Households with an Elderly Person					
Overall Participation Rate	30.2%	0.0	32.2%	0.0	1,346
Receipt of Public Assistance:					
Does not receive	18.9	-11.3	16.7	-15.6	814
Does receive	51.4	+21.3	57.9	+25.6	532
Presence of Earnings:					
No earnings	30.2	+ .0	30.8	- 1.5	1,147
Earnings	30.0	- .1	41.5	+ 9.2	199
Presence of Assets:					
No assets	37.2	+ 7.1	43.7	+11.5	669
Assets	23.9	- 6.3	20.9	-11.3	677
Households with a Disabled Person					
Overall Participation Rate	55.8%	0.0	55.7%	0.0	331
Receipt of Public Assistance:					
Does not receive	33.4	-22.4	32.0	-23.7	76
Does receive	62.5	+ 6.6	63.1	+ 7.4	255
Presence of Earnings:					
No earnings	59.2	+ 3.3	58.5	+ 2.8	262
Earnings	43.0	-12.9	43.4	-12.3	69
Presence of Assets:					
No assets	58.1	+ 2.3	61.8	+ 6.1	203
Assets	52.1	- 3.7	46.2	- 9.5	128

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

TABLE IV.2C

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FEMALE-HEADED AND TWO-PARENT
FSP-ELIGIBLE HOUSEHOLDS WITH CHILDREN,
BY
THE RECEIPT OF PUBLIC ASSISTANCE AND
THE PRESENCE OF EARNINGS AND ASSETS

	Regression-Adjusted Participation Rates		Univariate Participation Rates		
	Participation Rate	Deviation from Overall Rate	Participation Rate	Deviation from Overall Rate	Sample Size
Female-Headed Households with Children					
Overall Participation Rate	78.9%	0.0	69.6%	0.0	940
Receipt of Public Assistance:					
Does not receive	45.7	-33.2	30.4	-39.2	341
Does receive	90.7	+11.8	92.4	+22.8	599
Presence of Earnings:					
No earnings	84.4	+ 5.5	86.1	+16.5	566
Earnings	68.6	-10.3	43.5	-26.1	374
Presence of Assets:					
No assets	81.1	+ 2.2	77.0	+ 7.4	708
Assets	71.3	- 7.6	46.5	-23.1	232
Two-Parent Households with Children					
Overall Participation Rate	42.3%	0.0	41.0%	0.0	668
Receipt of Public Assistance:					
Does not receive	27.5	-14.8	26.9	-14.1	495
Does receive	83.2	+40.9	84.7	+43.7	173
Presence of Earnings:					
No earnings	38.0	- 4.2	52.0	+11.1	226
Earnings	44.5	+ 2.2	35.3	- 5.7	442
Presence of Assets:					
No assets	51.1	+ 8.8	56.6	+15.6	284
Assets	36.0	- 6.3	29.7	-11.3	384

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from the probit coefficients presented in Appendix B; the univariate participation rates are based on weighted sample estimates. The deviations from the overall rates are measured in percentage points.

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V. THE RELATIONSHIP BETWEEN FSP PARTICIPATION
AND THE FOOD STAMP BENEFIT AMOUNT

This chapter investigates the relationship between the size of the food stamp benefit and the probability of FSP participation. From a public policy perspective, this relationship is more important than the relationship between participation and the other demographic and economic characteristics of the household. These characteristics serve as proxies for the household's level of need (such as the number of persons and the presence of children) and resources (such as income and assets). While the relationship between these characteristics and FSP participation is of policy interest, one must recognize that Congress and program administrators have no direct control over the level of need and the resources of households eligible for the FSP. On the other hand, they directly control the level of food stamp benefits by setting the parameters of the program, such as the maximum allotment, the benefit reduction rate, and shelter, medical, and child care deductions.[29] Most program reforms imply changes in the amount of benefits for at least some eligible households. Thus, in order to forecast the impact of program reforms, it is important to understand how participation varies across households that qualify for different levels of benefits, and, in particular, how a change in the benefit amount for a given household affects that household's probability of participation. In recognition of the importance of the benefit-participation relationship, and in light of the methodological problems involved in

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[29]Congress and program administrators also have partial control over the costs of participation. The following are examples of aspects of the program that might affect the costs of participation: the requirement that able-bodied adult recipients register for work, the geographical distribution of food stamp offices, and the type of benefit issuance (over-the-counter versus by mail.) However, typical household surveys, such as SIPP and CPS, do not contain any information on the specific costs of participation incurred by each eligible household. Most of all, they lack detailed information on the place of residence of respondent households. Therefore, we cannot analyze the impact of these types of costs on participation.

estimating a behavioral relationship, we devote to this topic a separate chapter and a more in-depth analysis.

The remainder of this chapter is organized as follows. Section A evaluates the estimates of the benefit-participation relationship found in previous studies and discusses the methodological problems associated with these estimates. Section B contains our estimates of the benefit-participation relationship based on the 1985 SIPP data.

A. PREVIOUS ESTIMATES OF THE BENEFIT-PARTICIPATION RELATIONSHIP

The empirical evidence on the relationship between the benefit amount and FSP participation is mixed. On an a priori basis, one would expect that the data would show a positive relationship between participation and potential benefit amount. In other words, one would expect that a household entitled to a large food stamp benefit would be *more likely* to participate in the FSP than would a household entitled only to a small benefit, everything else held constant. The primary motivation for this expectation lies in the existence of fixed costs of participation. Both monetary and nonmonetary costs are involved in applying for benefits and in obtaining the coupons every month. Most of these costs are fixed--that is, they do not vary with the amount of the benefit. Thus, it seems plausible that as the amount of the benefit rises, while the costs of participation remain relatively constant, the probability of participation also increases. However, the results of existing studies on both the sign and the magnitude of this effect are far from unanimous.

Some studies, such as Smallwood and Blaylock (1985), Johnson, Chen, and Burt (1982), and Devaney and Fraker (1987), find a positive *sign* for the effect of potential benefits on participation. All three studies used a linear specification for the benefit variable, and were based on the 1977-78 Nationwide Food Consumption Survey. Despite these similarities, the *magnitude* of the estimated benefit effect varied substantially across the three studies (and even within each

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study) according to the specification of the participation equation and how the benefit variable was constructed for nonparticipating households.

Johnson et al. used two methods to construct the potential benefit amount. The first method entailed using one of two alternative proxy measures--the household's maximum allotment or the size of the household. The second method entailed exploiting information on the benefit amount for participating households to *impute* the potential benefit for nonparticipating households. Two alternative statistical techniques were used to perform the imputation.[30] The estimates of the benefit effect varied widely across the four specifications, in part because not all the four measures of potential benefits were expressed in the same units. But even if one restricts the comparison to the estimates obtained with the two imputation procedures, the differences remain substantial, as shown in the first two columns of Table V.1. The effect estimated with the second method is more than twice that estimated with the first method.

TABLE V.1

ESTIMATES OF THE EFFECT OF THE BENEFIT AMOUNT
ON THE PROBABILITY OF FSP PARTICIPATION

Data Set/Year	NFCS-LI 1977-78				PSID 1979	
Author(s)	Johnson et al. (1982)		Smallwood & Blaylock (1985)	Devaney & Fraker (1987)	Coe (1983)	
Method	Benefit imputed with				No. of children	
	OLS	Tobit			excluded	included
Percentage point difference in the probability of participation related to a $10 difference in the *monthly* benefit amount	2.3	4.8	1.5	1.7	0.6	-0.10

NOTE:The estimates presented by the authors were transformed to increase comparability. However, the comparability is far from perfect, due to differences in sample definitions, model specifications, and reference years.

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[30]One technique was OLS corrected for selection bias using the Heckman correction procedure; the second method was a Tobit estimation procedure.

Although the primary objective of the studies by Devaney and Fraker, and Smallwood and Blaylock was not to analyze FSP participation, each study included a participation equation in its model of food expenditures to control for differences between FSP participants and nonparticipants in factors that could affect expenditures on food. The two studies obtained very similar estimates of the benefit effect on participation, but well below those obtained by Johnson et al. (Table V.1).[31]

None of the studies discussed thus far included household size or the number of children among the explanatory variables in the participation equation.[32] Coe (1983) found that the estimates of the benefit effect were very sensitive to the inclusion of the number of children. When this variable was excluded from the equation, the estimated effect was positive and significant (although three times smaller than that estimated by Devaney and Fraker). When the number of children was included, the effect became *negative* and significant, indicating that the positive effect obtained in the first specification should be interpreted as a household size/composition effect, rather than as a net benefit effect (Table V.1).

All of the studies discussed thus far in this chapter used a *linear* specification for the benefit variable. A linear specification does not allow the relationship to change in magnitude (nonlinearity) or in sign (nonmonotonicity) over different ranges of the benefit variable. The study by Czajka (1981), based on 1979 Income Survey Development Program (ISDP) data, treated the benefit amount as a discrete variable, and included in the participation equation a dummy variable for each discrete interval. Czajka found that the benefit-participation

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[31]Devaney and Fraker imputed the benefit amount for nonparticipants using a Tobit regression method. Smallwood and Blaylock did not report the method they used to derive the benefit amount for nonparticipants.

[32]Johnson et al. included household size *only* as a proxy for the benefit amount, not simultaneously with it.

relationship was positive overall but nonmonotonic--that is, it increased over certain ranges but decreased over others.

These contradictory findings in the literature are symptomatic of the methodological problems involved in analyzing the benefit-participation relationship. Based on the literature review, as well as on our own experience, we have identified the following three broad methodological issues.

1. <u>Lack of independent variation in the benefit amount.</u> The FSP benefit amount varies little among households of the same size and with the same gross income, because FSP benefits are computed with a formula that includes the maximum allotment (a function of household size) and net income (which is equal to gross income minus allowable deductions).[33] Moreover, due to the institutional characteristics of the FSP, the benefit amount does not vary by geographic area, as does the AFDC program. This lack of variation implies that, when a cross-section of households is used for estimation, it is difficult to identify the effect of the benefit amount on participation separately from the effects of income and household size.

2. <u>Benefit amount not observed for nonparticipants.</u> Since the benefit variable is not observed for nonparticipants, it must be either imputed or simulated on the basis of the household's demographic and economic characteristics as reported in the survey. Thus, the simulated or imputed benefit variable is sensitive to a wide range of reporting errors and missing information. For example, households that underreport income during the interview are simulated to be eligible for a benefit amount larger than the amount for which they are actually eligible.

3. <u>Difficulties in modelling the participation decision.</u> The decision process undertaken by households in choosing whether to participate in the program is likely based on factors and circumstances that are not adequately reflected in survey data nor captured by a simple one-equation econometric model. The omission of some of these circumstances might distort the estimates of the benefit-participation relationship. One example is the lack of knowledge of program eligibility rules on the part of nonparticipating households. If households eligible for small amounts are less likely to be aware of their eligibility, their

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[33]Monthly net income is derived from monthly gross income by excluding certain income components (for example, the earnings of students 18 years of age or younger) and by subtracting deductions for allowable expenses (child care, medical, and shelter expenses) and a fraction of earnings that reflects taxes and work-related expenses.

lower participation rate is attributed to the smaller benefit amount, rather than to their lack of knowledge of the program.

B. SIPP-BASED ESTIMATES OF THE BENEFIT-PARTICIPATION RELATIONSHIP

Our approach to the analysis of the benefit-participation relationship is more elaborate than that found in the literature, and is designed to address some of the methodological concerns discussed in the previous section. Moreover, our approach is more complex than that followed in Chapters III and IV to analyze the relationship between participation and the other household characteristics. Therefore, a brief overview of the methodology is in order.

1. To remedy the fact that the benefit amount is not available for nonparticipants, we *simulated* the benefit amount on the basis of the household's current characteristics--that is, as if the household were actually applying for food stamps. The lack of some information in SIPP (for example, on medical expenses) makes this simulation imperfect. However, we believe that this solution represents an advance over regression-based imputation methods or the use of crude proxies, such as household size.[34] It is important to note that we simulated the benefit amount for *all* households, including those currently participating and reporting a benefit amount. Using reported benefits for participants and simulated benefits for nonparticipants would create a "double standard" that could bias the estimates of the benefit effect.[35]

2. We included both household gross income and household size in the participation equation. Thus, our estimate of the benefit effect we obtain is *net* of income and size effects. We also experiment with a specification that excludes the household size variable, in order to examine the sensitivity of the estimates.

3. We specified the benefit variable both as a discrete variable and as a continuous one. In the first part of the analysis, we broke the benefit amount down into *discrete* intervals, in the same manner that we treated other continuous variables (such as income and age) in the previous two

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[34]If the estimation results are to be used to simulate the effects of program reforms on participation, the solution of substituting benefits with household size is clearly unacceptable, since program reforms do not alter the size of households, while they do often change the amount of the benefits to which they are entitled.

[35]Table II.2 shows that the average simulated benefits for participants is only 2.6 percent higher than the average benefits observed in the FSP administrative data for the same period.

chapters. This specification allows us to compute and compare univariate and regression-adjusted participation rates for each discrete interval of the benefit variable. In addition, this specification provides a useful framework for exploring nonlinearities and nonmonotonicities in the benefit-participation relationship.

4. In the second part of the analysis we reestimated the participation equation treating the benefit amount as a *continuous* variable. The rationale for doing so is that these estimates are needed to simulate the effect of program reforms on participation. In a simulation context, one must be able to simulate the effect of *any* change in the benefit amount, including a change that may be too small to move a given household from one discrete benefit interval to the next. We used three different assumptions about how a continuous benefit variable enters the participation equation: linear (as in most of the literature), piecewise linear, and logarithmic.

The remainder of this section is organized as follows. In Section 1 we discuss the results obtained with the discrete specification of the benefit variable. Estimates are presented for both the entire FSP-eligible population and the four demographic subgroups. Section 2 discusses the continuous specification of the benefit variable. For brevity, the results are presented only for the entire FSP-eligible population.

1.   The Benefit Amount as a Discrete Variable

As mentioned earlier in this chapter, the FSP benefit amount is calculated with a formula based on the maximum allotment (which is a function of household size) and household monthly income net of allowable deductions. Thus, by construction, the benefit amount is correlated (positively) with household size and (negatively) with household total monthly income. On these grounds, one would expect that the estimated relationship between the benefit amount and participation is sensitive to the presence of household size and income in the participation equation. Analogously, one would expect that the relationship between these two variables and participation is sensitive to the inclusion of the benefit variable.

To verify these claims, we present the estimation results from three alternative specifications of the participation equation. Table V.2 contains the regression-adjusted participation rates based on these specifications, as well as the univariate participation rates. The first specification includes household size, income as a percentage of the poverty threshold, and the FSP benefit amount (all broken down into discrete intervals). This specification should be viewed as the "preferred" one.[36] The second specification excludes the household size variable, to investigate the impact of its exclusion on the benefit-participation relationship. Finally, the third excludes the benefit amount, to investigate whether the predicted participation at different household sizes and levels of income is affected by the presence of the benefit amount in the equation.[37]

The regression-adjusted participation rates by level of benefits (first column, top section of Table V.2) show an overall *increasing* pattern. Participation ranges from 35 percent for households entitled to $10 worth of food stamps per month to 52 percent among households entitled to more than $220 per month. This increase is not a strong one: a twenty-fold difference in the level of benefits is associated with a 17 percentage point difference in the probability of participation. If this difference is interpreted as a behavioral response, these results imply that the response to a change in benefits should be *positive but small*. More readily interpretable estimates of this response are presented in the next section.

The only exception to the overall increasing pattern of the benefit-participation relationship is the 3 percentage point *decrease* between the two intermediate intervals of the benefit distribution ($51 to $80 and $81 to $150). However, as shown in Table B.6, the

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[36]The t-statistics associated with the probit coefficients of the first specification are shown in Table B.6 in Appendix B.

[37]The other explanatory variables in the equation are the same as those used in the analysis presented in the previous chapters. They include age, race, education, the presence of children, the receipt of public assistance, assets, and the presence of earnings.

TABLE V.2

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS
BY
FSP BENEFIT AMOUNT, HOUSEHOLD SIZE, AND INCOME

	Regression-Adjusted Participation Rates Estimated Including:				
	Benefit Amount, Household Size, Income/Poverty	Benefit Amount - Income/Poverty	- Household Size, Income/Poverty	Univariate Rates	Sample Size
FSP Benefit Amount					
$10 or less	34.7	33.1	-	25.3	695
$11 to $50	41.7	41.2	-	33.2	680
$51 to $80	47.1	46.0	-	38.3	799
$81 to $150	44.1	46.6	-	55.1	704
$150 to $220	50.7	53.7	-	70.2	396
$220 or more	52.1	52.0	-	66.9	285
Household Size					
1 person	36.8	-	35.0	28.2	1,222
2 persons	46.9	-	45.4	45.6	747
3 persons	51.6	-	52.8	57.4	559
4 persons	46.3	-	48.5	55.3	464
5 persons	45.8	-	48.5	52.5	288
6+ persons	44.8	-	48.8	59.8	279
Income/Poverty					
Zero	36.4	35.2	40.5	24.9	160
1 to 50 percent	54.2	53.6	58.2	68.0	650
51 to 75 percent	53.8	53.1	55.7	59.8	654
76 to 100 percent	45.1	44.5	44.3	41.1	910
100 to 130 percent	30.7	31.7	27.9	20.5	865
131 percent or more	39.8	43.6	37.0	44.1	320

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The regression-adjusted participation rates are computed from probit coefficients; the univariate participation rates are based on weighted sample estimates.

difference between the participation equation coefficients that correspond to the two intervals is far from statistically significant.

Although this decrease in the regression-adjusted participation rate is not statistically significant, it still looks peculiar when compared with the 17 percentage point *increase* between the corresponding intervals in the *univariate* participation rates (fourth column in Table V.2). A possible explanation for the sharp increase in the univariate rate is the difference in average household size between the two intervals. In 1985, one-person households could not qualify for more than $80 worth of food stamps. Moreover, one-person households represent more than one-third of all FSP-eligible households. Therefore, households in the $51 to $80 interval are predominantly one-person households (58 percent), while those in the $81 to $150 intervals are entirely multi-person households. Since one-person households have a markedly low tendency to participate in the program, their dominant presence reduces the participation rate in the $51 to $80 interval.

In contrast to the first column of Table V.2, the regression-adjusted participation rates in column 2 were *not* estimated holding household size constant, because household size is excluded from the second specification of the participation equation. The effect of not controlling for household size is evident by the fact that participation no longer declines between $51 to $80 and $81 to $150 of benefits. More generally, however, the patterns of participation estimated by controlling and not controlling for household size are very similar: in both cases participation tend to increases with benefits, although by small amounts.

The third specification differs from the first in that the equation *excludes* the benefit variable. The purpose is to investigate the sensitivity of the estimated effects of household size and income on participation to the exclusion of the benefit variable; in the previous chapters, we excluded the benefit variable was excluded from the participation equations that we used to

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investigate the relationship between household characteristics and FSP participation.[38] A comparison between the first and the third columns in the middle and bottom section of Table V.2 clearly shows that the exclusion of the benefit variable has a relatively *minor* impact on estimates of the effect of income and household size on participation. Although some participation rates change by a few percentage points between columns 1 and 3, the differences by income and household size maintain their overall pattern. This pattern includes a "drop" in participation between three- and four-person households, as well as an irregular income-participation relationship, with the unexpectedly low and unexpectedly high participation rates at the two extremes of the income distribution—which was discussed in Chapter IV.

An Analysis of the Demographic Subgroups. We now extend the analysis of the benefit-participation relationship to the four demographic subgroups. The results are presented in Tables V.3 and V.4, while Table B.6 in Appendix B contains the probit coefficients for the "preferred" specification and their associated t-statistics.

The regression-adjusted participation rates for *households with an elderly member* (first column of Table V.3) present an U-shaped pattern, first increasing from 26 to 35 percent for benefits up to $80, and then decreasing to 31 percent for a benefit level above $80. However, the difference among the coefficients that correspond to the three higher intervals is not statistically significant (Table B.6), while the coefficient on the benefit interval of $10 or less is significantly lower than the coefficients for higher levels of benefits. This basically flat profile for the regression-adjusted participation rates contrasts with the increasing *univariate* participation rates (third column), which range from 24 to 44 percent. The regression-adjusted participation

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[38]Thus, the results of the second column are almost identical to those presented in Tables III.3A and IV.1A.

TABLE V.3

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FSP-ELIGIBLE HOUSEHOLDS
WITH ELDERLY OR DISABLED MEMBERS,
BY
FSP BENEFIT AMOUNT

| | Regression-Adjusted Participation Rates Estimated Including: | | | |
	Benefit Amount, Household Size, Income/Poverty	Benefit Amount - Income/Poverty	Univariate Rates	Sample Size
Households with an **Elderly Person**				
FSP Benefit Amount:				
$10 or less	25.8	24.1	23.6	531
$11 to $50	32.2	31.8	35.7	352
$51 to $80	35.2	35.1	37.4	314
$81 or more	30.8	39.6	44.2	149
Households with a **Disabled Person**				
FSP Benefit Amount:				
$10 or less	38.5	38.8	38.2	113
$11 to $50	56.3	56.1	56.0	69
$51 to $80	59.4	59.0	58.2	61
$81 to $150	70.3	70.9	72.2	55
$150 or more	81.0	80.6	82.8	33

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

TABLE V.4

REGRESSION-ADJUSTED AND UNIVARIATE
PARTICIPATION RATES AMONG FEMALE-HEADED AND TWO-PARENT
FSP-ELIGIBLE HOUSEHOLDS WITH CHILDREN,
BY
FSP BENEFIT AMOUNT

	Regression-Adjusted Participation Rates Estimated Including:			
	Benefit Amount, Household Size, Income/Poverty	Benefit Amount - Income/Poverty	Univariate Rates	Sample Size
Female-Headed Households with Children				
FSP Benefit Amount:				
$50 or less	77.5	72.2	43.2	134
$51 to $80	79.3	75.8	47.6	117
$81 to $150	80.2	79.1	73.9	327
$150 to $220	78.7	80.9	80.7	237
$220 or more	78.1	83.8	84.1	125
Two-Parent Households with Children				
FSP Benefit Amount:				
$50 or less	25.5	26.9	23.4	115
$51 to $80	41.4	43.5	33.7	93
$81 to $150	40.3	41.2	36.6	182
$150 to $220	52.7	53.4	56.8	129
$220 or more	48.1	44.4	50.8	149

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

rates estimated *without* holding household size constant (second column) also exhibit a monotonically increasing profile, ranging from 24 to 40 percent. This pattern suggests that most of the variation in the univariate rates is due to a household size effect, not to a benefit effect.

Another demographic group whose participation does not seem to be affected by the level of benefits are *female-headed households with children* (Table V.4). The pattern of the regression-adjusted rates is flat, with virtually no difference between the lowest levels of benefits and the highest. By contrast, the univariate rates exhibit a sharp increase, from 43 percent for households entitled to $50 or less in benefits to 84 percent for those entitled to more than $220. This pattern suggests that some of the characteristics of female-headed households are strongly correlated with both their probability of participation and with the level of benefits to which they are entitled. When the effect of these other characteristics on participation is eliminated by holding them constant at their sample means, the *net* benefit effect becomes almost nonexistent.

The pattern of participation by level of benefits appears to be very different among *households with a disabled member* (Table V.3). Both the regression-adjusted rates and the univariates rates exhibit a sharply increasing pattern, ranging from about 38 percent for households entitled to the $10 minimum to above 80 percent for those entitled to $150 or more. Although the differences among the various intervals are not always statistically significant, this sharply increasing pattern would suggest that participation among households with a disabled member is more responsive to differences in benefits than participation among elderly households.

Two-parent households with children (Table V.4) exhibit a pattern similar to that observed for households with a disabled member, although it does not increase as sharply. Both regression-adjusted and univariate rates range from about 25 percent for households entitled to the $10 minimum to about 50 percent for those entitled to $220 or more.

In conclusion, the results for the demographic subgroups imply that the participation rates of households that contain a disabled member and those headed by two adults are affected by the

level of benefits, while the participation rates of female-headed households and households that contain an elderly person are not. These results are not surprising, given what we know about the FSP participation of these subgroups. Female-headed households and elderly households have very high and very low overall participation rates, respectively, which tend to make them more insensitive to variations in the benefit amount than are households with a disabled member and those headed by two adults.

2. The Benefit Amount as a Continuous Variable

The breakdown of the benefit amount into discrete intervals is useful when conducting a descriptive analysis, such as that reported in Section B.1. However, when simulating the impact of benefit changes, one must be able to simulate the effect of *any* change in the benefit amount, including a change that may not be large enough to move a given household from one discrete benefit interval to another. Therefore, a behavioral response to a benefit change must be estimated by treating the benefit amount as a *continuous* variable.

The choice of a continuous versus discrete benefit variable is not the only specification issue relevant here. Another important issue is how possible nonlinearities in the benefit-participation relationship should be treated.[39] We considered three alternative specifications for a continuous benefit variable--linear, piecewise linear, and logarithmic. The *linear* specifications is the least flexible, because it implicitly assumes that a given change in benefits has

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[39]A third important issue is the specification of the income variable. We found that the coefficients of the benefit variable are very sensitive to whether the income variable is specified in discrete intervals (as it is done here) or linearly. The reason for such sensitivity is due to the fact that households with zero income and those with income above 130 percent of the poverty threshold have unexpectedly low and unexpectedly high participation rates, respectively. Ignoring these nonlinearities by specifying income linearly distorts the estimated benefit-participation relationship toward negative values, because the groups at the extremes of the income distribution tend to have high and low (simulated) benefit levels, respectively. For example, households with reported zero gross income are (simulated to be) eligible for the maximum benefit level, but also have an idiosyncratically low participation rate. The high benefit and low participation of this group might inject a negative bias in the benefit-participation relationship.

the same effect on participation at any level of benefits.[40] In other words, a $10 change in benefits has the same effect whether the household is currently entitled to a benefit of $20 or $200. Since all but one of the studies reviewed in Section A used a linear specification, we include it as a basis of comparison.

The *piecewise linear* specification allows the magnitude and even the sign of the participation response to a change in benefit to vary over different ranges of the benefit amount, while constraining the benefit-participation relationship to be linear within each range. This specification represents a fairly flexible way to specify the relationship between the two variables. The main disadvantage of a piecewise linear specification is that the points ("kinks") that delimit the different ranges must be chosen arbitrarily. One criterion that we found useful in making this choice is to avoid small samples between any two kink points,[41] because small samples tend to cause the estimated slopes to follow a more irregular pattern.

The *logarithmic* specification has three primary advantages: (1) it allows for a nonlinear effect, in the sense that a given dollar change in benefits has a *progressively smaller* effect on participation at higher levels of benefits; (2) it guarantees the monotonicity of the relationship; and (3) it requires only one coefficient on the benefit variable, which facilitates its use when simulating changes in participation.

Rather than directly presenting the estimated coefficients of the benefit variable in the three specifications, we converted them into a measure that is comparable across specifications— that is, the change (in percentage points) in the probability of participation associated with a $10

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[40]Due to the probit specification, the probability of participation is a nonlinear function of the explanatory variables, even when these enter linearly into the participation equation. However, such nonlinearity is minimal compared with that obtained by using, for example, a logarithmic specification of a variable.

[41]More precisely, we must ensure that the number of households whose simulated benefits fall between two *contiguous* kink points does not become too small.

change in benefits, computed at different levels of benefits. These measures are presented in the upper portion of Table V.5. The corresponding regression-adjusted participation rates are reported in the bottom part of Table V.5, and plotted in Figure V.1.

According to the linear assumption, a $10 increase in benefits is associated with approximately half of a percentage point increase in the probability of participation, regardless of whether the increase involves a household that currently receives, say, $10 or $200 worth of benefits.[42] It is worth recalling that this response is computed for an "average" eligible households--that is, using the sample mean values of all characteristics other than the benefit variable.

The participation response implied by the two other specifications differ considerably from those implied by the linear specification. The piecewise linear specification allows a more flexible response, but also an "irregular" one. We obtain a negative (albeit small) response in the $80 to $150 range, and a positive response in all other ranges. The negatively sloped segment can easily be seen in Figure V.1.

The logarithmic specification follows a pattern very similar to that of the piecewise linear, as shown in Figure V.1. In terms of the participation response to a $10 change in benefits, the logarithmic specification implies a 3.5 percentage point increase in the probability of participation among households currently entitled to $10 worth of benefits (for whom, in other words, benefits would double), but a much smaller response, a quarter of a percentage point, among those entitled to a $220 benefit. This concave pattern--that is, increasing at a decreasing rate--is a

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[42]These estimates are about half of those reported in Table V.1 and obtained from Devaney and Fraker (1987) and Smallwood and Blaylock (1985), adjusted for price change. If we used the rate of increase in the maximum allotment for a family of four between 1978 ($170) and 1985 ($264), the response to a $10 change in benefits in 1985 should be equivalent to the response to a $6.44 change in 1978. Therefore, the estimates comparable to those in Table V.5 become 1.1 percentage points for Devaney and Fraker, and 0.95 percentage points for Smallwood and Blaylock.

TABLE V.5

THE BENEFIT-PARTICIPATION RELATIONSHIP
ESTIMATED WITH ALTERNATIVE SPECIFICATIONS
OF THE BENEFIT VARIABLE

| Level of Benefits | Alternative Specifications of the Benefit Variable | | |
	Linear	Piecewise Linear	Logarithmic
	Regression-Adjusted Difference in Participation Associated with a $10 Increase in Benefits, Computed at Alternative Initial Levels of Benefits: (percentage point difference)		
$10	.462	2.69	3.52
$30	.465	1.24	1.52
$80	.470	-.51	.630
$150	.475	.322	.350
$220	.477	.323	.251
	Regression-Adjusted Participation Rates Computed at Alternative Initial Levels of Benefits:		
$10	40.0	35.6	35.0
$30	41.0	41.1	40.6
$80	43.3	47.4	45.8
$150	46.6	47.0	49.2
$220	49.9	49.3	51.2
$300	53.7	51.8	52.9

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

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FIG. V.1 ALTERNATIVE SPECIFICATIONS FOR
THE BENEFIT-PARTICIPATION RELATIONSHIP
All Eligible Households

Participation Rate

Simulated Benefit (1985 dollars)

— Logarithmic   — Linear   — Piecewise Linear
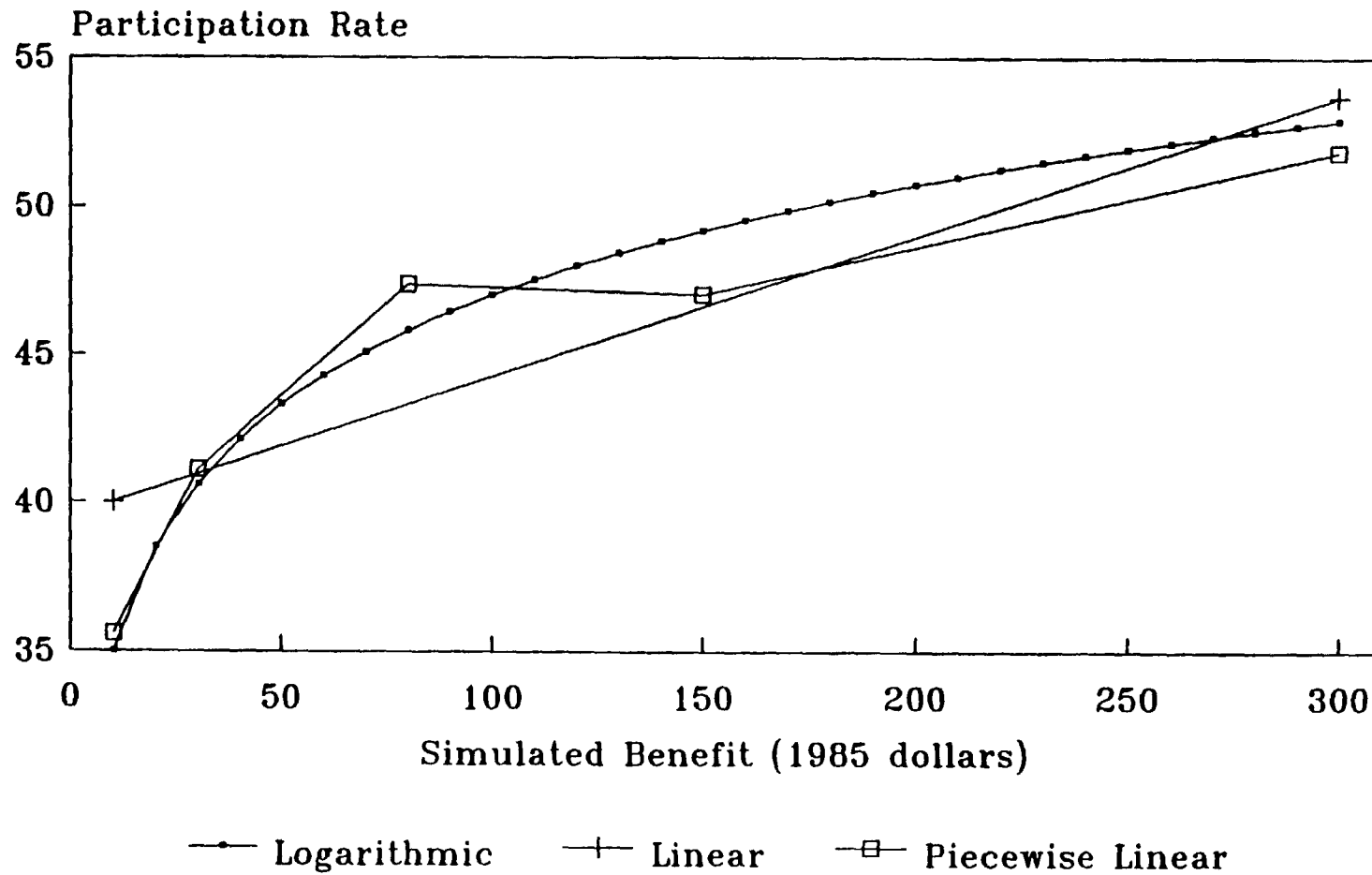
mathematical property of the logarithmic function. However, this is roughly the pattern followed by the piecewise linear specification. We believe that in this context the logarithmic represents a defensible way to "smooth out" the irregular pattern created by the piecewise linear specification.

When simulating the participation response to a change in benefits, using a nonmonotonic relationship can generate absurd results, such as a simulated *decrease* in the participation rate in response to an *increase* in benefits. We believe that the correct strategy for addressing with this problem is to use the overall positive estimated pattern of the benefit-participation relationship. The results shown above suggest that a logarithmic specification is an effective way to incorporate this positive relationship without the rigidity implicit in a linear specification.

VI. SUMMARY AND CONCLUSIONS

Policymakers have expressed considerable interest in the relationship between household characteristics and participation in the Food Stamp Program. Although several studies have used multivariate analyze to examine this relationship, and have identified characteristics that are positively or negatively associated with FSP participation, most used data that were collected prior to the elimination of the food stamp purchase requirement in 1979. In this report, we have used 1985 SIPP data to update previous multivariate analyses of participation in the FSP. We conducted the analysis both for the entire eligible population and for the following four demographic subgroups: households with an elderly member, households with a disabled member, two-parent households with children, and female-headed households with children. In this chapter, we highlight the most important findings of this report.

The Demographic Characteristics of Households. We examined the relationship between several demographic characteristics (that is, the age, education, and race/ethnicity of the reference person, the presence of children, and household size) and FSP participation. In general, households headed by persons younger than age 40 participate at higher rates than do households headed by older persons. Among the elderly, households headed by a person age 70 or older participate at a significantly lower rate than those headed by an individual 60 to 69 years, implying that the elderly FSP-eligible population should not be viewed as a homogeneous group in terms of its participation behavior. As we expected based on previous research, participation rates tend to decline as the education of the reference person increases, so that participation is generally

previous studies was that the presence of children younger than age 18, independent of other household characteristics, does not have a substantial effect on the participation rate. Finally, larger households tend to participate at higher rates than do smaller households; in particular, participation is exceptionally low among one-person households.

Because so many elderly households contain only one person, we investigated the relationship between one-person households and elderly households and found that, excluding the effect of age, one-person households participate at very low rates, and, excluding the effect of household size, households that contain an elderly member participate at significantly lower rates than do households that do not contain an elderly member. However, being elderly and living alone does not appear to affect the probability of participation significantly.

The Economic Characteristics of Households. In addition to examining the demographic characteristics of households, we examined the relationship between several household economic characteristics (that is, the ratio of the household's income to the poverty threshold, whether the household receives public assistance, whether the household has earnings, and whether the household has positive assets) and FSP participation. We found that households with no income participate at rates that were lower than one would expect, given their lack of resources. However, this low rate of participation is probably due to the fact that income is underreported. In general, among households that reported positive incomes, participation declines as the income to poverty ratio increases. We found that the receipt of public assistance is the strongest predictor of FSP participation--households that receive public assistance participate at substantially higher rates than those that do not. Although previous studies have consistently found that earnings are negatively associated with participation, we found that the effect of the presence of earnings was large and statistically significant only among female-headed households with children.

The FSP Benefit Amount. In Chapter V, we investigated the relationship between the probability of participation and the size of the benefit to which the household is entitled. Rather than merely providing descriptive information, the purpose of this analysis was to generate estimates that could be used in simulations of program reforms—that is, to predict how FSP participation would change under a reform that alters the size and distribution of the benefit across households.

We found that the relationship between the FSP benefit amount and participation in the program is *positive* overall. However, when income, household size, and other demographic and economic characteristics are held constant, the *net* effect of the benefit amount on participation is rather *small*: the difference in the participation rate between households that are entitled to $10 or less worth of food stamp benefits and those that are entitled to more than $220 is approximately 15 percentage points. An intuitive way to express the relationship between benefits and participation is the percentage point increase in participation associated with a $10 increase in benefits. The analysis suggests that such an increase elicits a different response according to the current level of benefits: at $30, the participation response to a $10 increase is 1.5 percentage points. However, the response drops to 0.35 percentage points at $150 of current benefits.

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APPENDIX A

(Table 3 in Allin and Beebout, 1989)

TABLE A.1

THE DIRECTION AND SIGNIFICANCE OF THE ESTIMATED EFFECTS OF THE
FSP BENEFIT AMOUNT AND SELECTED HOUSEHOLD CHARACTERISTICS
ON THE PROBABILITY OF PARTICIPATION IN THE FSP,
FROM EIGHT MULTIVARIATE ANALYSES

	Study, Data Source, and Year(s) Data Collected							
	MacDonald (1977) 1972 PSID[a]	Czajka[b] (1981) 1979 ISDP[c]	Johnson, Chen, and Burt[d] (1982) 1977-1978[e] NFCS-LI	Coe (1983) 1979 PSID[a]	Chen and Johnson[f] (1982) 1977-1978[e] NFCS-LI	Chen (1983) 1977-1978[e] NFCS-LI	Smallwood and Blaylock (1985) 1977-1978[e] NFCS-LI	Devaney and Fraker (1987) 1977-1978[e] NFCS-LI
FSP Benefit Amount	+ #	+	+ #	- #	o[g]	+[h] #	+[i]	+ #
Household Income	#	+[k]	- #	- #	+[g]	- #	#	- #
Education of Household Head	-[m]	# _	# _	# -	# -	# -[n]	# -	# -#
Race Is Black/Nonwhite		+ #	+ #	+	+ #	+	+ #	+ #
Female Head of Household Only		+ #	+ #	-[o]	+ #	+ #	+ #	+[p] #
Male Head of Household Only			- #	-[o] #	-	- #		-
Head of Household Employed	-[q] #	-[r]	- #	- #	- #	- #	- #	- #
Household Receives Other Welfare Assistance	+ #	+ #	+ #	+ #	+ #	+ #		
Household Head Is Elderly	- #	- #	- #	o	- #	- #	-	- #
Household Owns Home			- #		- #	- #	- #	- #
Household Located in Northeast	- #		+ #		+ #	+ #	+ #	+[o] #

NOTES: A "+" signifies that this variable was estimated to have a positive effect on the probability of participation in the FSP, while a "-" signifies that the estimated effect was negative. A "#" signifies that the estimated effect was significant at or below the .10 level. The variables included in this table are a subset of all of the variables that were included in these studies.

[a]Panel Study of Income Dynamics.

[b]Separate equations were estimated from two models for each of three months. One model (Model 1) included welfare income as an explanatory variable, while the other model (Model 2) did not. The sign and significance refer to the findings in the majority of the equations from Model 2.

[c]Income Survey Development Program Research Test Panel.

[d]Results are for the LGT4 model, which the authors found to dominate the other models estimated.

Table A-1 (continued)

[a]Low-Income Supplement to the Nationwide Food Consumption Survey.

[b]Results are for the logit-recursive model, which the authors found to dominate the other models estimated.

[c]Chen and Johnson included the FSP benefit amount in the measure of household income. Thus, the separate effect of the benefit cannot be determined, and this measure of household income may not be comparable to the measures used in the other studies. The authors did include a measure of the maximum food stamp allotment, and found that it had a significant positive effect on the probability of participation.

[d]Chen included the FSP maximum allotment, not the FSP benefit amount.

[e]We obtained the sign of the food stamp benefit effect from the derived reduced form of Smallwood and Blaylock's participation equation. No level of significance is available.

[f]MacDonald did not include household income in the study but did include a four-year (1968-1971) sum of the household's decile position in the size distribution of a family income-needs ratio.

[g]The household income measure used in this paper was household income divided by the value of the household's poverty threshold.

[h]Household income was included in Smallwood and Blaylock's structural model, but a reduced-form estimate of the effect of this variable on participation is not available.

[m]The effect of an education of 9 to 11 years on the probability of participation was not significant.

[n]The coefficient on the indicator for high school education was not significant, but the coefficient on the indicator for college education was significant.

[o]Coe combined the age, gender, and martial status variables into a composite variable. He found that households headed by unmarried women were less likely to participate in the FSP than married couples, ages 30 to 39 years, and this effect was significant for women 60 or older. Households headed by men 30 or older were significantly less likely to participate than those other two groups.

[p]This effect was not significant when the estimated equation was unweighted.

[q]This indicator is for whether the household head was in the labor force and does not differentiate between employed and unemployed.

[r]The indicator equals 1 if the household received any employment income.

[s]The category is Northeast *and* Central.

APPENDIX B

TABLE 8.1

EFFECTS OF A UNIT CHANGE IN THE EXPLANATORY VARIABLES
ON THE PROBABILITY OF FSP PARTICIPATION:
ALL HOUSEHOLDS

	Probit Coefficients x Normal Density Evaluated at the Mean x 100 (t-Statistics of the Probit Coefficients)							
Age of Reference Person:								
15 to 29 years	-		-6.24	(1.99)	1.81	(0.58)	3.88	(0.97)
30 to 39 years	6.24	(1.99)	-		8.06	(2.53)	10.1	(2.50)
40 to 59 years	-1.81	(0.58)	-8.06	(2.53)	-		2.06	(0.59)
60 to 69 years	-3.88	(0.97)	-10.1	(2.50)	-2.06	(0.59)	-	
70 years and older	-16.6	(4.18)	-22.9	(5.60)	-14.8	(4.37)	-12.7	(3.86)
Race/Ethnicity of Reference Person:								
White non-Hispanic	-		-5.03	(2.16)	2.90	(0.89)	2.90	(0.89)
Black non-Hispanic	5.03	(2.16)	-		7.93	(2.29)	7.93	(2.29)
Hispanic	-2.90	(0.89)	-7.93	(2.29)	-		-	
Education of Reference Person:								
Less than high school	-		4.77	(1.99)	16.0	(4.80)	16.0	(4.80)
High school	-4.77	(1.99)	-		11.2	(3.29)	11.2	(3.29)
More than high school	-16.0	(4.80)	-11.2	(3.29)	-		-	
Size of Household:								
1 person	-		-11.1	(3.72)	-18.6	(4.50)	-14.1	(2.98)
2 persons	11.1	(3.72)	-		-7.51	(2.09)	-3.00	(0.73)
3 persons	18.6	(4.50)	7.51	(2.09)	-		4.51	(1.22)
4 persons	14.1	(2.98)	3.00	(0.73)	-4.51	(1.22)	-	
5 persons	14.5	(3.03)	3.39	(0.82)	-4.13	(1.16)	.383	(0.10)
Presence of Children:								
Children present	6.53	(1.74)	6.53	(1.74)	6.53	(1.74)	6.53	(1.74)
Household Income/Poverty Threshold:								
Zero	-		-18.0	(3.50)	-9.26	(1.87)	12.5	(2.35)
1 to 50 percent	18.0	(3.50)	-		8.82	(2.99)	30.5	(8.93)
51 to 100 percent	9.26	(1.87)	-8.82	(2.99)	-		21.7	(8.41)
101 to 130 percent	-12.5	(2.35)	-30.5	(8.93)	-21.7	(8.41)	-	
131 percent and more	-2.30	(0.37)	-20.3	(4.59)	-11.5	(3.12)	10.2	(2.62)
Receipt of Public Assistance:								
Does receive	47.7	(21.9)	47.7	(21.9)	47.7	(21.9)	47.7	(21.9)
Presence of Assets:								
Has assets	-14.1	(6.77)	-14.1	(6.77)	-14.1	(6.77)	-14.1	(6.77)
Presence of Earnings:								
Has earnings	-9.11	(3.40)	-9.11	(3.40)	-9.11	(3.40)	-9.11	(3.40)
Constant	-27.4	(5.28)	8.27	(1.68)	-20.3	(3.33)	-32.59	(5.38)

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The estimates presented in different columns are based on algebraically equivalent specifications of the same participation equation: each specification uses a different excluded level for each multi-level variable.

EFFECTS OF A UNIT CHANGE IN THE EXPLANATORY VARIABLES
ON THE PROBABILITY OF FSP PARTICIPATION:
HOUSEHOLDS WITH AN ELDERLY PERSON

	Probit Coefficients x Normal Density Evaluated at the Mean x 100 (t-Statistics of the Probit Coefficients)							
Age of Reference Person:								
Less than 60 years	-		-4.29	(0.69)	4.36	(0.68)	4.36	(0.68)
60 to 69 years	4.29	(0.69)	-		8.66	(2.92)	8.66	(2.92)
70 years and older	-4.36	(0.68)	-8.66	(2.92)	-		-	
Race/Ethnicity of Reference Person:								
White non-Hispanic	-		-1.78	(0.33)	-4.99	(1.56)	-4.99	(1.56)
Hispanic	1.78	(0.33)	-		-3.20	(0.57)	-3.20	(0.57)
Black non-Hispanic	4.99	(1.56)	3.20	(0.57)	-		-	
Education of Reference Person:								
Less than high school	-		4.29	(1.07)	4.40	(0.72)	4.40	(0.72)
High school	-4.29	(1.07)	-		.109	(0.01)	.109	(0.01)
More than high school	-4.40	(0.72)	-.109	(0.01)	-		-	
Size of Household:								
1 person	-		-6.12	(1.77)	-16.7	(3.00)	-21.4	(2.78)
2 persons	6.12	(1.77)	-		-10.6	(1.87)	-15.3	(1.98)
3 persons	16.7	(3.00)	10.6	(1.87)	-		-4.71	(0.56)
4 persons	21.4	(2.78)	15.3	(1.98)	4.71	(0.56)	-	
5 persons	24.1	(3.55)	18.0	(2.65)	7.45	(0.99)	2.73	(0.30)
Household Income/Poverty Threshold:								
Zero	-		-10.7	(0.49)	-19.2	(0.91)	.984	(0.04)
1 to 50 percent	10.7	(0.49)	-		-8.49	(1.40)	11.7	(1.81)
51 to 100 percent	19.2	(0.91)	8.49	(1.40)	-		20.2	(5.90)
101 to 130 percent	-.984	(0.04)	-11.7	(1.81)	-20.2	(5.90)	-	
131 percent and more	9.03	(0.42)	-1.70	(0.23)	-10.2	(2.16)	10.0	(2.03)
Receipt of Public Assistance:								
Does receive	32.0	(11.35)	32.0	(11.35)	32.0	(11.35)	32.0	(11.35)
Presence of Assets:								
Has assets	-13.4	(4.71)	-13.4	(4.71)	-13.4	(4.71)	-13.4	(4.71)
Presence of Earnings:								
Has earnings	-.164	(0.03)	-.164	(0.03)	-.164	(0.03)	-.164	(0.03)
Constant	-39.5	(1.82)	-20.9	(2.36)	-7.39	(0.84)	-22.8	(2.22)

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The estimates presented in different columns are based on algebraically equivalent specifications of the same participation equation: each specification uses a different excluded level for each multi-level variable.

EFFECTS OF A UNIT CHANGE IN THE EXPLANATORY VARIABLES
ON THE PROBABILITY OF FSP PARTICIPATION:
HOUSEHOLDS WITH A DISABLED PERSON

	Probit Coefficients x Normal Density Evaluated at the Mean x 100 (t-Statistics of the Probit Coefficients)							
Age of Reference Person:								
15 to 29 years	-		-3.59	(0.30)	13.8	(1.33)	23.1	(1.75)
30 to 39 years	3.59	(0.30)	-		17.4	(2.01)	26.7	(2.29)
40 to 59 years	-13.8	(1.33)	-17.4	(2.01)	-		9.23	(0.97)
60 years or older	-23.1	(1.75)	-26.7	(2.29)	-9.23	(0.97)	-	
Race/Ethnicity of Reference Person:								
White non-Hispanic	-		-7.26	(0.70)	-15.7	(2.28)	-15.7	(2.28)
Hispanic	7.26	(0.70)	-		-8.45	(0.78)	-8.45	(0.78)
Black non-Hispanic	15.7	(2.28)	8.45	(0.78)	-		-	
Education of Reference Person:								
Less than high school	-		5.52	(0.75)	8.40	(0.80)	8.40	(0.80)
High school	-5.52	(0.75)	-		2.88	(0.26)	2.88	(0.26)
More than high school	-8.40	(0.80)	-2.88	(0.26)	-		-	
Size of Household:								
1 person	-		-11.1	(1.42)	-2.81	(0.28)	-24.3	(2.12)
2 persons	11.1	(1.42)	-		8.33	(0.86)	-13.2	(1.16)
3 persons	2.81	(0.28)	-8.33	(0.86)	-		-21.5	(1.75)
4 persons	24.3	(2.12)	13.2	(1.16)	21.5	(1.75)	-	
5 persons	23.4	(2.17)	12.2	(1.16)	20.6	(1.82)	-.934	(0.07)
Household Income/Poverty Threshold:								
1 to 50 percent	-		-1.27	(0.08)	12.1	(0.78)	20.0	(1.19)
51 to 100 percent	1.27	(0.08)	-		13.4	(1.84)	21.3	(2.20)
101 to 130 percent	-12.1	(0.78)	-13.4	(1.84)	-		7.90	(0.81)
131 percent and more	-20.0	(1.19)	-21.3	(2.20)	-7.90	(0.81)	-	
Receipt of Public Assistance:								
Does receive	29.4	(3.99)	29.4	(3.99)	29.4	(3.99)	29.4	(3.99)
Presence of Assets:								
Has assets	-6.00	(0.95)	-6.00	(0.95)	-6.00	(0.95)	-6.00	(0.95)
Presence of Earnings:								
Has earnings	-16.1	(1.80)	-16.1	(1.80)	-16.1	(1.80)	-16.1	(1.80)
Constant	-8.16	(0.41)	9.58	(0.60)	-24.0	(1.57)	-19.6	(1.06)

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The estimates presented in different columns are based on algebraically equivalent
specifications of the same participation equation: each specification uses a different
excluded level for each multi-level variable.

EFFECTS OF A UNIT CHANGE IN THE EXPLANATORY VARIABLES
ON THE PROBABILITY OF FSP PARTICIPATION:
FEMALE-HEADED HOUSEHOLDS WITH CHILDREN

	Probit Coefficients x Normal Density Evaluated at the Mean x 100 (t-Statistics of the Probit Coefficients)					
Age of Reference Person:						
15 to 29 years	-		.289	(0.07)	12.1	(2.84)
30 to 39 years	-.289	(0.07)	-		11.8	(2.79)
40 to 59 years	-12.1	(2.84)	-11.8	(2.79)	-	
60 years or older	-12.7	(1.76)	-12.4	(1.73)	-.588	(0.08)
Race/Ethnicity of Reference Person:						
White non-Hispanic	-		.953	(0.18)	-.488	(0.13)
Hispanic	-.953	(0.18)	-		-1.44	(0.28)
Black non-Hispanic	.488	(0.13)	1.44	(0.28)	-	
Education of Reference Person:						
Less than high school	-		8.37	(2.31)	4.84	(0.93)
High school	-8.37	(2.31)	-		-3.52	(0.68)
More than high school	-4.84	(0.93)	3.52	(0.68)	-	
Size of Household:						
2 persons	-		-5.99	(1.40)	-10.1	(2.10)
3 persons	5.99	(1.40)	-		-4.20	(0.92)
4 persons	10.1	(2.10)	4.20	(0.92)	-	
5 persons	11.2	(2.28)	5.27	(1.17)	1.07	(0.21)
Household Income/Poverty Threshold:						
Zero	-		-27.4	(2.79)	-18.3	(1.88)
1 to 50 percent	27.4	(2.79)	-		9.06	(2.13)
51 to 100 percent	18.3	(1.88)	-9.06	(2.13)	-	
101 percent and more	7.34	(0.70)	-20.0	(3.85)	-11.0	(2.71)
Receipt of Public Assistance:						
Does receive	41.2	(11.68)	41.2	(11.68)	41.2	(11.68)
Presence of Assets:						
Has assets	-9.25	(2.54)	-9.25	(2.54)	-9.25	(2.54)
Presence of Earnings:						
Has earnings	-15.2	(3.74)	-15.2	(3.74)	-15.2	(3.74)
Constant	-13.1	(1.37)	10.6	(1.54)	-1.06	(0.14)

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The estimates presented in different columns are based on algebraically equivalent
specifications of the same participation equation: each specification uses a different
excluded level for each multi-level variable.

EFFECTS OF A UNIT CHANGE IN THE EXPLANATORY VARIABLES
ON THE PROBABILITY OF FSP PARTICIPATION:
TWO-PARENT HOUSEHOLDS WITH CHILDREN

	Probit Coefficients x Normal Density Evaluated at the Mean x 100 (t-Statistics of the Probit Coefficients)					
Age of Reference Person:						
15 to 29 years	-		-12.0	(2.11)	-1.30	(0.21)
30 to 39 years	12.0	(2.11)	-		10.7	(1.90)
40 to 59 years	1.30	(0.21)	-10.7	(1.90)	-	
60 years or older	13.8	(1.39)	1.82	(0.19)	12.5	(1.31)
Race/Ethnicity of Reference Person:						
White non-Hispanic	-		13.3	(2.17)	-.348	(0.05)
Hispanic	-13.3	(2.17)	-		-13.7	(1.83)
Black non-Hispanic	.348	(0.05)	13.7	(1.83)	-	
Education of Reference Person:						
Less than high school	-		-5.59	(1.13)	10.9	(1.58)
High school	5.59	(1.13)	-		16.5	(2.38)
More than high school	-10.9	(1.58)	-16.5	(2.38)	-	
Size of Household:						
3 persons	-		8.47	(1.38)	8.57	(1.40)
4 persons	-8.47	(1.38)	-		.097	(0.01)
5 persons	-8.57	(1.40)	-.097	(0.01)	-	
Household Income/Poverty Threshold:						
Zero	-		-12.8	(1.15)	.059	(0.00)
1 to 50 percent	12.8	(1.15)	-		12.8	(2.14)
51 to 100 percent	-.059	(0.00)	-12.8	(2.14)	-	
101 percent and more	-16.1	(1.37)	-28.9	(4.29)	-16.1	(3.04)
Receipt of Public Assistance:						
Does receive	61.0	(10.33)	61.0	(10.33)	61.0	(10.33)
Presence of Assets:						
Has assets	-15.0	(3.20)	-15.0	(3.20)	-15.0	(3.20)
Presence of Earnings:						
Has earnings	6.49	(1.15)	6.49	(1.15)	6.49	(1.15)
Constant	-12.7	(1.17)	-4.15	(0.43)	-30.6	(2.88)

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The estimates presented in different columns are based on algebraically equivalent
specifications of the same participation equation: each specification uses a different
excluded level for each multi-level variable.

TABLE 8.6

EFFECTS OF A CHANGE IN THE BENEFIT AMOUNT
ON THE PROBABILITY OF FSP PARTICIPATION

FSP Benefit Amount	Probit Coefficients x Normal Density Evaluated at the Mean x 100 (t-Statistics of the Probit Coefficients)									
All Eligible Households										
$10 or less	-		-7.18	(2.17)	-12.6	(3.69)	-9.56	(2.19)	-16.1	(2.86)
$11-$50	7.18	(2.17)	-		-5.42	(1.73)	-2.38	(.63)	-9.00	(1.78)
$51-$80	12.6	(3.69)	5.42	(1.73)	-		3.03	(.87)	-3.57	(.77)
$81-$150	9.56	(2.19)	2.38	(.63)	-3.03	(.87)	-		-6.61	(1.61)
$151-$220	16.1	(2.86)	9.00	(1.78)	3.57	(.77)	6.61	(1.61)	-	
$221 or more	17.5	(2.61)	10.3	(1.68)	4.91	(.86)	7.95	(1.55)	1.33	(.26)
Households with an Elderly Person										
$10 or less	-		-6.54	(1.83)	-9.37	(2.42)	-5.13	(.868)		
$11-$50	6.54	(1.83)	-		-2.82	(.726)	1.40	(.246)		
$51-$80	9.37	(2.42)	2.82	(.726)	-		4.23	(.749)		
$80 or more	5.13	(.86)	-1.40	(.246)	-4.23	(.749)	-			
Households with a Disabled Person										
$10 or less	-		-17.7	(2.04)	-20.8	(2.34)	-32.5	(2.88)	-46.1	(2.87)
$11-$50	17.7	(2.04)	-		-3.09	(.32)	-14.7	(1.32)	-28.3	(1.80)
$51-$80	20.8	(2.34)	3.09	(.32)	-		-11.6	(1.03)	-25.3	(1.62)
$81-$150	32.5	(2.88)	14.7	(1.32)	11.6	(1.03)	-		-13.6	(.93)
$151 or more	46.1	(2.87)	28.3	(1.80)	25.3	(1.62)	13.6	(.93)	-	
Female-Headed Households with Children										
$50 or less	-		-1.77	(.313)	-2.70	(.449)	-1.11	(.140)	-.550	(.054)
$51-$80	.313	(1.77)	-		-.932	(.171)	.659	(.092)	1.22	(.128)
$81-$150	.449	(2.70)	.932	(.171)	-		1.59	(.314)	2.15	(.282)
$151-$220	.140	(1.11)	-.659	(.092)	-1.59	(.314)	-		.561	(.081)
$221 or more	.054	(.550)	-1.22	(.128)	-2.15	(.282)	-.561	(.081)	-	
Two-Parent Households with Children										
$50 or less	-		-17.1	(2.08)	-16.1	(1.96)	-28.3	(2.85)	-23.8	(2.09)
$51-$80	17.1	(2.08)	-		1.03	(.12)	-11.2	(1.14)	-6.65	(.58)
$81-$150	16.1	(1.96)	-1.03	(.12)	-		-12.2	(1.56)	-7.69	(.80)
$151-$220	28.3	(2.85)	11.2	(1.14)	12.2	(1.56)	-		4.54	(.58)
$221 or more	23.8	(2.09)	6.65	(.58)	7.69	(.80)	-4.54	(.58)	-	

SOURCE: August 1985 SIPP Food Stamp Eligibility File.

NOTES: The estimates presented in different columns are based on algebraically equivalent specifications of the same participation equation: each specification uses a different excluded level for each multi-level variable.